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FOOD INDUSTRIES

JAN 2 8 1946

● FOR THOSE WHO CONTROL QUALITY HROUGH MANAGEMENT AND PRODUCTION

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JANUARY 1946

Feeding Europe—
America's Problem

Crisis in Employee
Relations

Advantages of
Rotary Lye Peeler

Controlling Yeast
With Oxide Gases

Studies Show Value
Of Lecithin in Bread

Common Ailments
In Processed Foods

What Sanitation
Means to Canners

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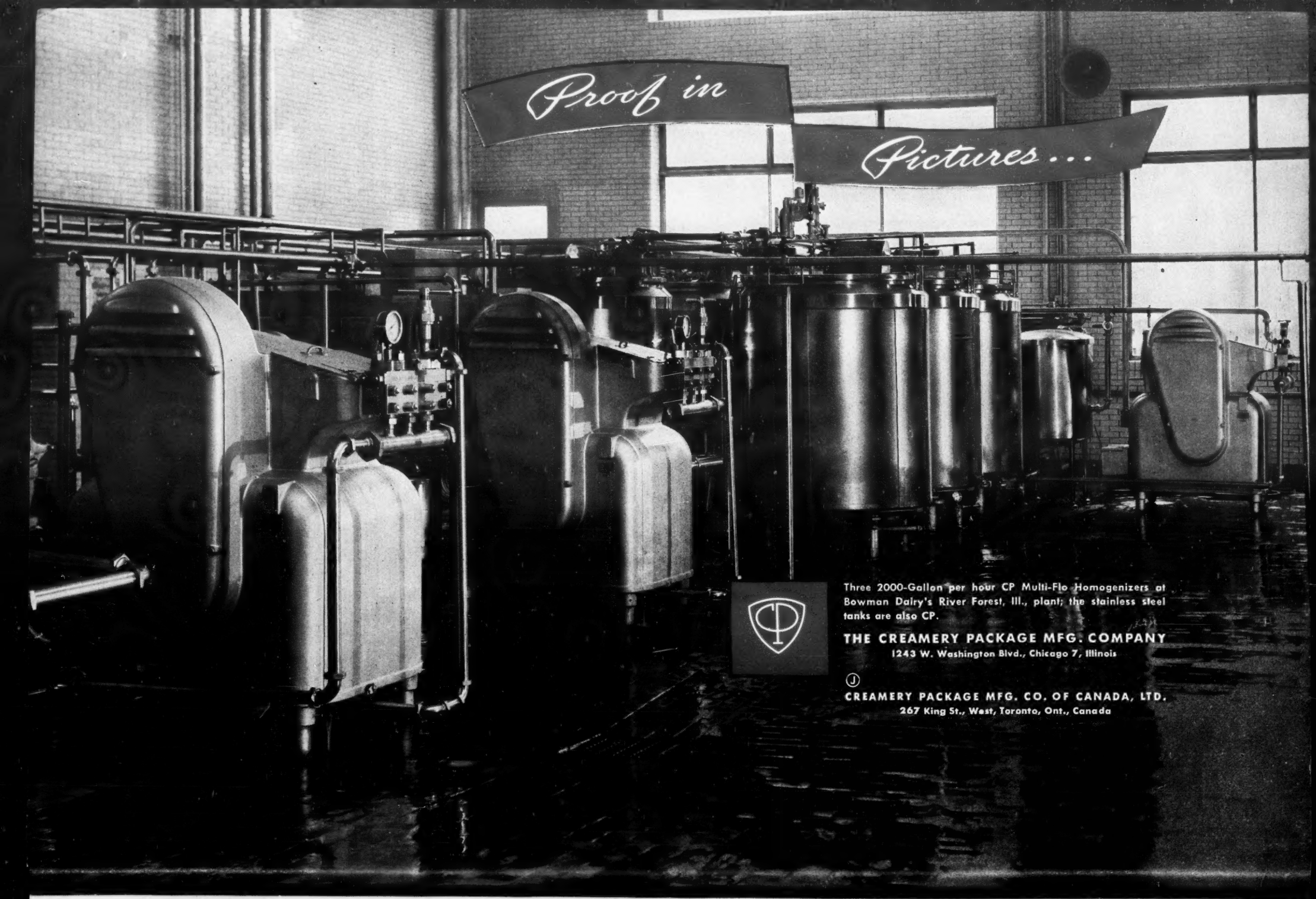

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THE COVER

As with empty bottles returned to the fluid milk plant, the bottles coming back to the brewery for a refill are thoroughly cleaned in large, high-capacity washers with automatic control of temperature in each of the washing and rinsing stages. The picture on the cover shows clean beer bottles discharging from the washer at the Brewing Corporation of America plant in Cleveland.

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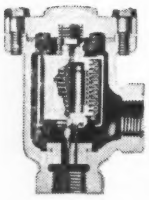
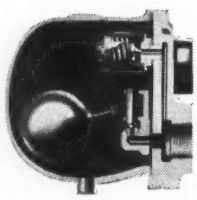
WHEN YOU SEE - THIS

SOMEBODY LOSES—THREE WAYS



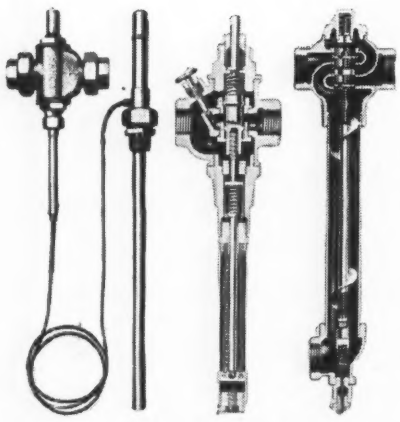
No. 9-100 thermostatic steam trap



Float-thermostatic steam trap

It's an innocent looking little stream of water, sometimes with a lot of vapor and at others quite cold. But it runs all day, and there are a score or more places in your plant where this is taking place, although most of them are not visible.

Occasionally an operator will do something about it but mostly it runs merrily on, wasting heat or cooling water—and indicating a loss in productive capacity.



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In a few hours and at a cost that will soon be forgotten, you can connect one or more of the Sarco products shown at the left. From then on, winter and summer, noon or midnight, there will be no wasted heat or water; no lost production.

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Whether it's heating, cooking, drying, cooling or refrigeration, both the *quantity* and the *quality* of the product will be improved because the temperature is always at its best.

The Sarco representative near you can tell you how.

101

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How To Pay the High Wages

LEST management make the error of attempting to smash unions, it is advisable to make a cool-headed appraisal of the situation. No matter how seemingly impossible are the demands for large wage-rate increases, nor how outrageous are the violations of contracts, in the long run it is better to move deliberately than to indulge in retaliation should opportunity present itself.

The No. 1 fact, never to be forgotten, is the political power of workers. They outnumber management and investors by at least 20 to 1. It would be folly to try to smash them. Any success would be followed by grave political repercussions. Any group possessing a huge majority can elect whom it pleases and write laws pretty much as it pleases.

Anger over violation of contracts and silly strikes is understandable, but it should not lead to reprisals that, in turn, will lead to political counter-reprisals. That course will spell disaster.

The No. 2 fact is that there are no more avid readers of published corporation reports than union leaders. They do not always interpret figures in the same way as management. And being only job-and-wage conscious, labor has no present interest in production or sales problems. They see figures called "reserves," or "surplus" or "earned surplus." Union leaders do not, however, realize that such figures are only symbols for something that may be dollars in the bank but more often represent value of buildings and equipment and inventories.

Wages cannot be paid with anything but cash, yet the corporate reserves and surplus accounts are what organized labor seem to rely upon for payment of increased wage rates. And to complicate management's perplexities, OPA seriously believes that many wage increases can be made without raising prices to get the cash. OPA, with government backing, will grant price relief only after a six-month period of losses (or profits below 1942 levels). Obviously, top OPA officials as well as union officials are expecting to be quite generous with corporate reserves. This generosity with the other fellow's money is a well-known trait of humanity.

Unfortunately for the peace of mind of management, labor has no intention of resting on any plateau of wages. Labor's avowed intention is to force a "continuing expanding economy" by still higher wages. There may be setbacks and depressions, but labor is on a crusade for what it believes to be economic expansion. The strategy is good political-economy theory, though the tactics are bludgeoning, crude and often bloody.

What Is Management to Do?

Management faces a new problem for which it is, alas, often not well prepared. The heads of some corporations have been known to be mere babes when at the bargaining table.

With an uncontrollable superior force on an economic crusade, what is management's proper course in the future? Two courses are suggested.

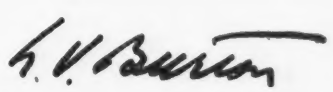
First, management must familiarize itself with economic and sociologic history so that, when a better-informed labor leader makes a demand or an assertion, the managers will know the historical precedent for such demand and its ultimate outcome.

Second, management must conserve corporate reserves in the face of labor's insistence that its expanding-economy theory can be proved only by prepaid higher wage rates. Such conservation can be had only by matching productivity per man with wages per man. The answer is to make machines work harder—or else lose the corporate reserves.

The better place to look for relief is not to price increases that are politically unpopular, but to a firm's own research, development and engineering departments. Wages will go up, hence productivity per man must be increased by research and engineering development. And all this must be achieved now, while a company still has the wherewithal.

That is management's great obligation. It must adapt itself to the economic theory that motivates the more powerful political majority. It must realize that there is a marked similarity between powerful labor leaders and powerful military leaders. Neither hesitates to sacrifice lives or property to attain an objective. Reserves of a corporation will be as readily sacrificed as any other property by organized labor to test its economic theory.

Management must and can meet the challenge by means of improved technology and machines.



EDITOR

The Talk of the Industry

• MANY food manufacturing companies have postwar plans but it seems as if Flako Products Corp. will be one of the first to get into high gear. This company ordered new equipment several years ago, before United States got into the war. Today it has almost a top priority, and is beginning to receive the equipment. This is quite in contrast to the situation of some processors who placed orders only recently and were told that delivery dates were from 6 to 24 months away.

• CROP REPORTS have it that 1946 strawberry acreage will be 19 percent larger than last year. But where is the sugar to go with them? Freezing, canning or preserving all require sugar.

• ONE of the novel incidents of the year took place during a session of the Packaging Institute. A panel of machinery manufacturers sat on the platform and tried to answer questions from their potential customers on the floor. Nearly every machine manufacturer pleaded that 1946 deliveries were sold out and that 1947 was the earliest possible date they could expect further deliveries. The users on the floor began to demand why the makers did not utilize subcontracting to get the machines produced more promptly.

Although the result of the discussions did not make it too clear, OPA price control seemed to be a major factor. The machine builders are forced to sell at 1941 prices, yet labor costs are up 35 percent and material costs are 15 percent higher than in 1941. When a firm subcontracts for the production of its machine parts, the subcontractor seemingly is not subject to OPA ceilings. One manufacturer reported that the outside contracts were costing four times as much as it would in his own factory.

Another factor is the shortage of young engineers for detailed parts design, thanks to putting every possible technical man into the armed forces.

The whole session was marked with good humor, but it must have come as a bit of a jolt to those who had argued that future packaging machines would be very much like prewar models—that no radical design changes were in the offing—when one man, speaking from the floor, drew prolonged applause when he stated that, it was his belief, some very radical changes were in order. The applause appeared to be one of the most significant events in the two-day session. It was obvious that most of the users of packaging machines really want to see something new and different.

This desire for the new, we believe, extends to almost everything. It would certainly be absurd to think that it is only the users of packaging machines who are looking for innovations.

• LOOKING for innovations is one thing; visualizing them is something else. Although the users of packaging machines obviously want new ideas incorporated in their next purchases it was not apparent that anyone was ready with a list of the things he hoped to find. To express dissatisfaction with things as they are is the first step toward progress, but to state exactly what one wants to get is far more likely to produce prompt results.

• DECEMBER 1945 is the first time in the history of this publication when there have been no demands upon its editors to make a publishable forecast for 1946. In the past, all sorts of "Services" and newspapers have requested our views at a time of the year when, frankly it would be more appropriate to be thinking of Christmas or to be addressing a few Christmas cards to long neglected friends.

The sudden cessation of the annual demand for predictions, though most welcome, leaves us with a sense of unsatisfied curiosity. One wonders what brought it about. Could it be that the aforesaid "Services" and newspapers are short of paper? Or are they imbued with a feeling that there are plenty of gratuitous predictions from Walter P. Reuther (of UAW-CIO fame), and others, who are motivated by the high purpose of saving the United States economy from disaster by raising wages 30 percent without raising prices? Is it due to the At---c energy furore, or is everybody fed up with predictions?

Hors d'Oeuvres

• A&P has succeeded in killing the mold in bread by exposing the loaves to 5 seconds of high-frequency dielectric heat. Will this development electronicute the use of chemical mold inhibitors in the staff of life?

• *Word came from Budapest recently that the city will be "the greatest graveyard of all times" unless food is rushed there immediately. Between the atomic ashes of the people who don't have to worry about hunger and the stomach aches of those who do, it looks like a belly full of trouble all around.*

• Though rats will eat anything if pressed, they are choosy when plenty of food is available. So maybe you could organize the rodents in your warehouse into quality-control tasting panels.

• *"Just as World War II has dramatized the use of radar and atom spliting, it has dramatized the spectacular restorative ability of proteins and the aminos they are made of." So says American Meat Institute. As if we don't have enough trouble with vitamins, now we have to get technical about the "magic aminos." And, by the way, since when does one have to be persuaded to eat meat?*

• The Administration's farm policy for 1946 is to hold off production controls, make plenty of food available for home and abroad and, if prices start to slip, toss in the government chips to buy and stockpile surplus. Ought to make everybody happy except the taxpayers, and during the war even they learned to prefer food to funds.

• *Four principal factors determine the quality of a cup of coffee—flavor, aroma, clarity and strength. But many restaurants believe that only might is right.*

• Purified minerals, vitamins, carbohydrates, fats and proteins were placed before rats, in separate containers. And the rodents unerringly ate the amount of each required to keep them in the best of health. What does that make us two-legged gluttons?

F. K. L.

With dire food shortages in nearly all European cities, sights like this are far more frequent than most Americans believe. Some inconvenience, but very little real sacrifice, on our part, is all the author suggests by way of helping to relieve this distress.

CALORIES OR CATASTROPHE

Tragic food shortages in Europe's cities are real, and America must accept a course of action that will protect its vital stake in world security. Here is an estimate of the needs of our starving neighbors and a program for supplying our just share

By JOHN H. CASSELS, Formerly of the Foreign Economic Administration, Washington, D. C.

FROM a humanitarian viewpoint, the situation in Europe is grave and appealing. The extent of the misery that will result there this winter from lack of food and lack of fuel is difficult for us, in our comfort, to vision or believe. Yet that is not the ground on which the shipment of food to Europe will find its strongest or its soundest justification. This is a case where hard heads will carry us further than soft hearts. Our objective must not stop short with the prevention of starvation or of disease and unrest. We have a vital stake in the quick and complete recovery of neighbor nations across the Atlantic—their economic recovery, their social recovery, and their political recovery.

Food is an indispensable prerequisite of recovery and stability. It is important both physically and psychologically. Without sufficient food the peoples of Europe will not have the energy or the stamina necessary for effective work on the reconstruction tasks with which they are confronted. The effect of food deficiencies on the output of coal was quickly brought to attention because of the critical importance of fuel.

Psychologically, also, food has a special importance at the present time. Scientific experiments with human subjects on semi-stavation diets have indicated that the two most marked mental changes are: first, a loss of ambition; and second, an increase of irritability. In circumstances where initiative and tolerance are particularly needed, this becomes a matter of serious concern. In addition we must remember that all through the war the propaganda broadcasts of the Allies promised the peoples of Europe that food would flow in freely as soon as the armies of the enemy were driven out. After V-E Day these hopes were deferred. They were told that shipping shortages would prevent the fulfillment of our pledges till the war had been won in the Pacific. Now V-J Day is past and still the quantities of food reaching European ports are far below what the people had been led to expect. Deprivations, which were endured with stoicism in wartime, are not willingly accepted as necessary

now. Controls are becoming more difficult to enforce. Maldistribution is even more noticeable now than ever before.

Would Have Starved

Relief supplies that have been shipped in the past few months from this country, from Canada and from other parts of the world, have been of inestimable importance. They have made the difference, in many cases, between starvation and survival. The people of the Netherlands date their liberation, not from the time when the Germans were driven from their soil, but from the day on which food was first dropped to them from Allied planes. The wife of a French coal miner will show you the one can of food in her cupboard—a can of meat and vegetable stew distributed the preceding week from U. S. Army stocks—and tell you that it will be the basis of a better meal for her family than they have had for months. French officials in Paris will tell you how the arrival of shipments of American lard brought down the black market price by 50 percent. The matron at a large orphanage in Rome will let you see seven hundred homeless children at their meager noon-day meal and will explain that they *do* get milk at breakfast time—one cupful each, made from American dried milk powder.

Similar evidence comes in from every side. The food we have already sent has had great value and the gratitude with which it has been received is touching. The question remains, however: "Have we done enough?" What should we send to Europe in 1946? The answer can only come from an objective examination of the factual evidence about the situations as they now exist in the various countries with which we are concerned—particularly the conditions that are likely to prevail between now and next harvest-time.

To get the present European food picture in its proper perspective, we must view it against the background of prewar conditions and the changes that have taken place in the intervening years. Even in normal times Europe needed food imports. She also depended on substantial imports of fertilizers and feedingstuffs to maintain her own output of crops and livestock products. Six countries on the western and northern edge of the continent (France, Belgium, Netherlands, Denmark, Norway and Finland) used to import each year about 2,000,000 tons of phosphate rock, 3,000,000 tons of oil cake, 8,000,000 tons of grain, more than 500,000 tons of fats and oils, and nearly 500,000 tons of sugar. Five Mediterranean and central European countries (Italy, Greece, Yugoslavia, Austria and Czechoslovakia) imported 1,000,000 tons of phosphate rock, about 300,000 tons of oil cake, 1,500,000 tons of grain, and more than 250,000 tons of fats and oils. When these imports were cut off, food supplies were affected both directly and indirectly. Crop yields began to fall, grain and potatoes had to be diverted from feed to food uses, livestock numbers had to be reduced, and the output of animal products suffered even greater declines.

In addition to the interruption of normal trade, many other factors contributed to the progressive decline in agricultural output during the past five years. Most important among them were: the losses of draft animals through German requisitioning, shortages of fuel for tractors, scarcity of labor, the deterioration of machinery and other equipment, and the lack of certain ingredients required for the manufacture of pesticides. These factors operated with cumulative effects all through the period of the war. Finally, in the year just past, the situation was made still worse by exceptionally unfavorable weather conditions and by the violent campaigns that were fought on every front. The winter of 1944-45 was one of unusual severity. The summer of 1945 brought a drought to the whole of the western Mediterranean area, including half of France, which had been unparalleled in 20 years.

War Damage

The effects of direct war damages, although often exaggerated, were by no means negligible. In some areas fighting was going on when cultivation or planting should have been in progress. In the Netherlands ten percent of the farm land was flooded. In Italy land was taken out of cultivation both by flooding and by mining. German settlers in northern Yugoslavia had to be evacuated and a section of the most productive land of the country remained idle through the growing season. Transportation came practically to a standstill and perishables spoiled on the farms. Refineries were short of fuel, and sugar beets rotted in the fields. In many regions the farmers suffered from the foraging and pillaging of advancing or retreating armies. Administrative controls broke down, money had uncertain value and economic relations were disrupted. With this background it is easy to understand why production in 1945-46 will be substantially below what it was in 1944-45 and will be far below the prewar level.

Starvation Diets

The seriousness of this situation, from a consumption point of view, is apparent from an examination of the calorie levels that would prevail in the different countries, during the current year, if food imports were not available to supplement the supplies obtained from indigenous production. In prewar years practically all these countries had diets that provided on the average close to 3,000 calories per head per day. In the current consumption year—the 12-month period between the 1945 harvest and the 1946 harvest—the levels without imports would be approximately as follows: France 1,800, Belgium 1,100, Netherlands 1,350, Denmark 3,000, Norway 1,400, Finland 1,750, Italy 1,500, Austria 1,500, Greece 1,300, Yugoslavia 2,300, Czechoslovakia 2,450, Hungary 2,100, Rumania 2,450, Bulgaria 2,450.

These figures are striking enough in themselves, but they do not fully reveal the acuteness of the problem that has to be dealt with. They are merely statistical averages for the populations as a whole. Difficulties of distribution have the effect of concentrating the impacts of shortages on particular groups in the populations. The broadest distinction in this respect is between producers and nonproducers. As a general rule the farm populations in all countries have been able throughout the war to maintain their own consumption at relatively satisfactory levels. In consequence the non-farm segment of the population in each case has had a smaller share of the limited national supplies that were available. Nor does the problem of maldistribution end with the distinction between these two principal classes of consumers. Within the non-farm groups there have been wide disparities resulting in part from differential rationing and in part from differences in other circumstances such as income level, access to black market supplies, availability of unrationed foods, and so on. The full picture of these disparities cannot be presented statistically, but the situations of the non-producer groups in the various countries may be illustrated by another set of average figures. It is roughly estimated that without imports their calorie levels for the current year would be as follows: France 1,250, Belgium 750, Nether-

These Italians are eagerly retrieving scraps of bread left from a meal served to American troops. The hungry people cluster around virtually all Army food dumps in this fashion.

lands 900, Denmark 2,900, Norway 950, Finland 1,000, Italy 950, Czechoslovakia 2,000, Hungary 1,450, Rumania 1,500, Bulgaria 1,650. It is obvious that, in several of these countries, domestically produced supplies would be insufficient to prevent widespread starvation and that in none except Denmark would supplies be sufficient to maintain their commercial and industrial populations in a fit condition for the trials and efforts that lie ahead of them.

How Much Can We Help?

The question of how much help we should give to Europe in this emergency food situation is a matter of direct concern to all American citizens. Everyone in this country will be affected by the short-run effects and the long-run consequences of whatever it is decided to do or not to do. If the decisions made are to be sound and statesmanlike, many factors will have to be taken into account and carefully balanced against one another. In doing this a wholesome combination of foresight, wisdom and practical common sense is urgently required. First of all, there are questions of payment and financing. To what extent should the supplies that countries receive be determined by their ability to pay? How much should be distributed to nonpaying countries through UNRRA? Should special credit terms or grants-in-aid be offered to our western European Allies to facilitate the financing of part or all of their emergency food requirements? The answers we should give to these questions will depend, on the one hand, on factual evidence of the ability of the various countries to pay for what they need, and on the other hand, on the importance we attach to the meeting of their needs.

It is with the second of these that we are concerned here. The same considerations will be relevant in determining the distribution that should be made of the total supplies under our control. The limitation of our own consumption is naturally irksome. The maintenance of rationing controls is a decidedly unpleasant prospect. If these things are to be accepted by the people of the United States, they must be justified by the urgency of the needs that have to be met elsewhere in the world. In a similar way, the quantities that we should send to any particular country, or to any one group of countries, will depend on the relative urgency of its needs as compared with the needs of others—the quantities they can produce for themselves, the supplies they can secure from sources outside the United States, and the amounts we find it necessary to send to competing claimants.

Although the actual process by which food supplies are allocated is necessarily a complicated one, a straightforward analysis of needs, designed to serve as the basis for broader policy decisions, can be presented in relatively simple terms. From the evidence presented above it is clear that Europe cannot maintain herself without imports. Everyone agrees that some shipments are required. The question that remains to be answered is "How much?"—not only how much in total, but how much of each of the principal types of foods should be supplied? The greater the volume of imports obtained by the European countries, the lower will be the urgency of the needs that still remain unsatisfied. The greater the extent to which our exports cut into the supplies available for domestic consumption, the more conscious we will be of our own desire for the things that we are giving up. When certain levels of consumption have been reached in the countries receiving the supplies, we will decide that the intensity of their needs has been reduced to a point where it no longer outweighs the difficulties we would incur in making more available.

We may rule out immediately the possibility of restoring in Europe anything approximating their prewar levels and patterns of consumption. To do that for the six western and northern countries referred to above would require imports of between 25- and 30,000,000 tons of assorted foods, mostly grain, but also including substantial quantities of all the other major products. To do it for the Mediterranean and central European group (five countries) would require between 15- and 20,000,000 tons. Those figures indicate the enormous size of the deficits with which these countries have to contend, but they cannot serve us directly for practical planning purposes.

Let us next consider a relief consumption goal so low that we could not seriously entertain the idea of accepting it. For the sake of simplicity it may be defined merely in terms of the calories provided per head per day. Corresponding import requirements may be stated in terms of the amounts of wheat that would be necessary to make up the calorie deficits. If the calorie levels in Allied countries were to be the same as they were in 1943-44, when Germany still controlled the continent, and the national average level in ex-enemy countries were set at 2,000 calories, what imports would be required? For the six western and northern countries the equivalent of about 500,000 tons of wheat would be needed. For the five Mediterranean and central countries the figure would be

The cameraman happened along during a WAC party at this Italian orphanage. The author gives a far different picture of a normal noon meal where the matron explains that "they do get milk at breakfast—one cupful each made from American dried milk powder."

close to 4,000,000 tons. Britain would need about 9,000,000 tons and Germany might have to be supplied with 2- or 3,000,000 tons. The total for these 13 countries on this basis would be in the neighborhood of 20,000,000 tons. Assuming that one-half or two-thirds of the imports would come from other countries, the U. S. shipments, together with those we would have to make to the Far East and elsewhere, could be provided without serious difficulty. Exports of food in the past twelve months have added up to more than 8,000,000 tons and during this period our consumption level has been higher than prewar by approximately 7 percent. With European consumption at the desperately low levels resulting from these assumed imports, and our own consumption as far above theirs as it is, the American people could hardly feel that they had done all they wanted to do.

Reasonable Goal

A consumption goal for Europe that might appeal to Americans as more reasonable in the circumstances could be defined perhaps as follows: The national average level in each of the continental Allied countries should be 2,650 calories. The level in the United Kingdom should be the same as it was in 1943-44, and in all ex-enemy countries the levels should be set at 80 percent of what they were before the war. If these calorie levels were to be met, the import requirements of wheat would be roughly as follows: Western and northern group between 8- and 9,000,000 tons; Mediterranean and central group about 7,000,000; Britain about 9,000,000; Germany perhaps between 5- and 6,000,000; and Poland an uncertain amount that we might put at 2,000,000. For Europe as a whole, including the United Kingdom, but without provision for any parts of Russia, imports on this basis would total between 30- and 35,000,000 tons. These figures are large, but they are not beyond the range of practicability. During the war we have become accustomed to setting ourselves objectives that were high and then overshooting the mark. This volume of shipments to Europe cannot be provided by the supplying countries without a conscious and determined effort, but in an emergency we expect such efforts to be called for. Even with these imports the consumption level in the continental Allied countries would fall short of ours by 600 or 700 calories. In ex-enemy countries the level would be 900 or 1,000 calories below our own. Because of inevitable disparities in distribution already referred to, a national level of 2,650 would not insure more for nonfarm consumers than about 2,300 on the average, and large sections of the urban populations would be much worse off than this figure would suggest. The question that must be asked in supplying countries is, "Can we afford to do less than this?"

So far we have simplified our discussion by speaking of food supplies as if they could be defined in calorie terms alone. We know, of course, that this fails to bring out all the elements in the situation that need to be considered. People are concerned with the *quality* of their diets —the *kinds* of foods they have to eat. In this respect also the war brought a deterioration of consumption in Europe. People had to cut down drastically the quantities they ate of meat, milk, cheese, butter, eggs, sugar and other preferred commodities. Their diets have consisted in very large part of bread and potatoes —and the bread itself was poor in quality. Their position relative to ours can be simply stated in this way: We get one-third of our calories from cereals and potatoes, two-thirds from other foods. In 1944 the European countries had to depend on cereals and potatoes for two-thirds of their calories and obtained only one-third from preferred commodities. By far the largest proportion of the supplies to be sent will be grain, but import requirements will have to include other items as well. Most important among these will be fats and oils. Milk products will also be essential in relief feeding. Sugar is urgently wanted by many of the countries and high quality protein foods such as meat, fish, beans, and peas will be asked for to make up keenly felt deficiencies.

We Must Accept Controls

We can make available our share of the supplies that are needed, without running any nutritional risks, only if we are willing to accept during the next few months the special controls that are necessary for the emergency management of our food resources. More important than anything else in determining the amount of food that we can supply to the countries that are in distress will be our willingness or our unwillingness to accept such controls. This is the only real sacrifice that would be involved. It would affect most directly the processors and distributors of food products. For that reason, their appraisal of the urgency of the need to be met and their judgments about the extent of American obligations with respect to them are of key significance to the nation and to the world at the present time.

Crisis in Employee Relations

Causes underlying labor-management disputes are narrowed down in this study to four factors, three of which are more or less under management's direct control. And the fourth factor should be fully understood by all concerned

By O. C. COOL, Director, Labor Relations Institute, New York, N. Y.

THERE are four outstanding factors in the current employee relations crisis. And all of them deserve the serious consideration of management, no matter how free management may be momentarily from labor difficulties of its own. There is no such thing as lasting immunity from strike or stoppage, and the employer who keeps informed regarding the trend as a whole will be the better prepared to avoid trouble in the future.

Here are the points that stand out when the reconversion picture is studied and dissected:

1. The trend away from collective bargaining.
2. The major weak spots in management's armor:
   a. Unsound disciplinary practices.
   b. Widespread wage inequities.
3. Foremen's unionization.
4. White-collar organization.

The trend away from real collective bargaining is the gravest development that has taken place in labor-management relations since the end of the war. For years, labor vociferously accused management of evading and bypassing collective bargaining. But now the shoe is on the other foot. The strategy of labor today is to steer clear of the negotiating process. Here are some of the weapons that are being used to prevent the adjustment of differences around the conference table:

Cool-off Period?

A strike vote under the Smith-Connolly Act is becoming a common resort. Before they even sit down to negotiate, some unions are making it a practice to go to the National Labor Relations Board and request a strike vote. If it is taken and the members approve—as they generally do—the union is free to call a strike within 30 days. What was intended by the sponsors of the law to be a "cooling off" period, after all possible alternatives had failed, is perverted into a combination deadline and club. In the tense atmosphere which follows the voting, management "negotiates" with a pistol pressed to its head. Obviously, this is not conducive to the give-and-take of real collective bargaining.

Management at McCormick & Co., Baltimore, maintains close ties with its labor force by faithfully adhering to its pledge to foster a cooperative spirit among all its fellow workers. Here the factory board meets under the framed expression of that pledge.

Good Faith

Encouraged as it is by present Department of Labor practices, the "good faith" increase is bound to grow. "Before we sit down to negotiate our final demands," this proposition goes, "give us a 5 percent increase as evidence of your good faith in collective bargaining." The employer who grants this request merely plays into the hands of those who wish to boost wages way above the present scale. Once the employer gives the 5 percent, he virtually is obligated to talk on the basis of 30 percent—with the 5 percent excluded entirely from the area of negotiation. The wise employer will resist all demands for good-faith increases. His willingness to sit down and negotiate is all the good-faith evidence necessary. Refusal of a good-faith increase does not constitute an unfair labor practice.

Forced Arbitration

Forced or "split" arbitration entered the oil industry case. Management offered a 15 percent increase. The union countered with a 30 percent demand—and the government imposed arbitration of the difference, not of the entire 30 percent. The danger of this method, which may well spread and multiply, is that it may spoil arbitration as a solution of disputes by developing into a two-edged sword. What is to stop management, for instance, from saying to a union during an off year, "We think wages should be cut 30 percent, and you say 10 percent is all you can stand. Let's arbitrate the difference!"

It might be well for management to point this out to labor at every

possible opportunity. Arbitration is too trusty a dispute-settlement tool to be debased in this fashion.

All three of the variations named —strike votes before negotiations, good-faith increases, and split arbitration—are hazards to collective bargaining in the future. Both labor and management should see to it that true collective bargaining be preserved and utilized to the fullest possible extent.

Disciplinary Methods

In cases too numerous to cite here, the "hook" on which reconversion labor disputes have been mounted is some unsound disciplinary action on the part of the employer concerned.

The war resulted in a great influx of marginal workers, including some who are downright insubordinate, incapable and even malicious. But in justice to employees—and also to the company's labor relations and community relations—the punishment for rule infractions should fit the crime. Indiscriminate layoffs are certainly not the answer here.

There are certain infractions that should be punished by discharge. Generally speaking, drunkenness on the job, gross insubordination, and conduct that endangers the lives and limbs of others are reasonable causes for discharge. But these "felonies" are few in number when compared with the lesser misdemeanors—tardiness, unexcused absence, smoking on the job, failure to report spoilage, and the like.

Example after example over the years has convinced me that layoffs for punishment are futile as a corrective. The worker who has been punished in this fashion usually harbors resentment for the shame he has suffered in the eyes of his family and friends—not to mention the loss of income, which may work considerable hardship.

I believe in the warning system, but not the public "shame on you" sort conveyed with orange-colored cards and big type. These make the worker lose face and suffer embarrassment. The method that works best employs routine communications to the effect that such-and-such a rule has been broken, and a record made of the offense. After so many warnings, depending on the nature of the infraction, the worker is discharged for good and all. There need be no recriminations, no scolding, no fireworks from the union. The record is there on the books, to refute any charge of "unfair labor act" or discrimination.

It is a grave indictment that only one company in the United States out of five has a printed book of rules. Even fewer than one out of five have a standard system of disciplinary practices. This is a situation that top management should, and must, correct.

Good discipline starts at the top. The manager or superintendent who smokes a cigar in the shop can hardly expect workers to observe the no-smoking rule. Executives who ride up and down in freight elevators to save steps only incite people in the plant to do the same thing. "They get away with it. Why shouldn't I?" is still a basic human reaction.

Wage Inequities

Another outgrowth of the war is the haphazard way in which wage rates and salary scales have been permitted to develop, in spite of stabilization. Whether it be in the plant or in the office, there is no room today for inequities in pay, for they are among the most prominent causes of discontent. In the course of our job-evaluation work for hundreds of companies, we have found that the slight cost involved has paid handsome dividends. Scientific job evalution *frees management to manage.*

There is another important aspect to this subject. Job evaluation vastly simplifies the task of collective bargaining, not only by eliminating contention over inequities, but also by narrowing the field of wage negotiation to the basic hourly rate.

Foreman Unionization

The growth of foreman unionization is not just a wartime phenomenon. In fact, reconversion tends to speed up the process, because cutbacks and layoffs in many industries have made it necessary to demote thousands of foremen to the rank-and-file. Joining a foreman's union is no guarantee against demotion, but these organizations do hold out the hope of maximum job security, plus accumulated seniority status upon return to subordinate posts, if the latter cannot be averted. The success of various unions in obtaining pay increases and fringe raises for production workers has also given foremen food for thought. This is especially true in cases where the average worker's take-home pay has equalled, and sometimes even passed, that of the supervisor.

You can't keep foremen from organizing by calling them "supervisors," "sub-executives" or by some other title. The NLRB goes by job content, not title. But there are certain positive steps that can be taken in order to make foremen conscious of their role as part of management and to give them satisfactions, income and prerequisites that fit their concept of a foreman's job. Here are some that have worked out:

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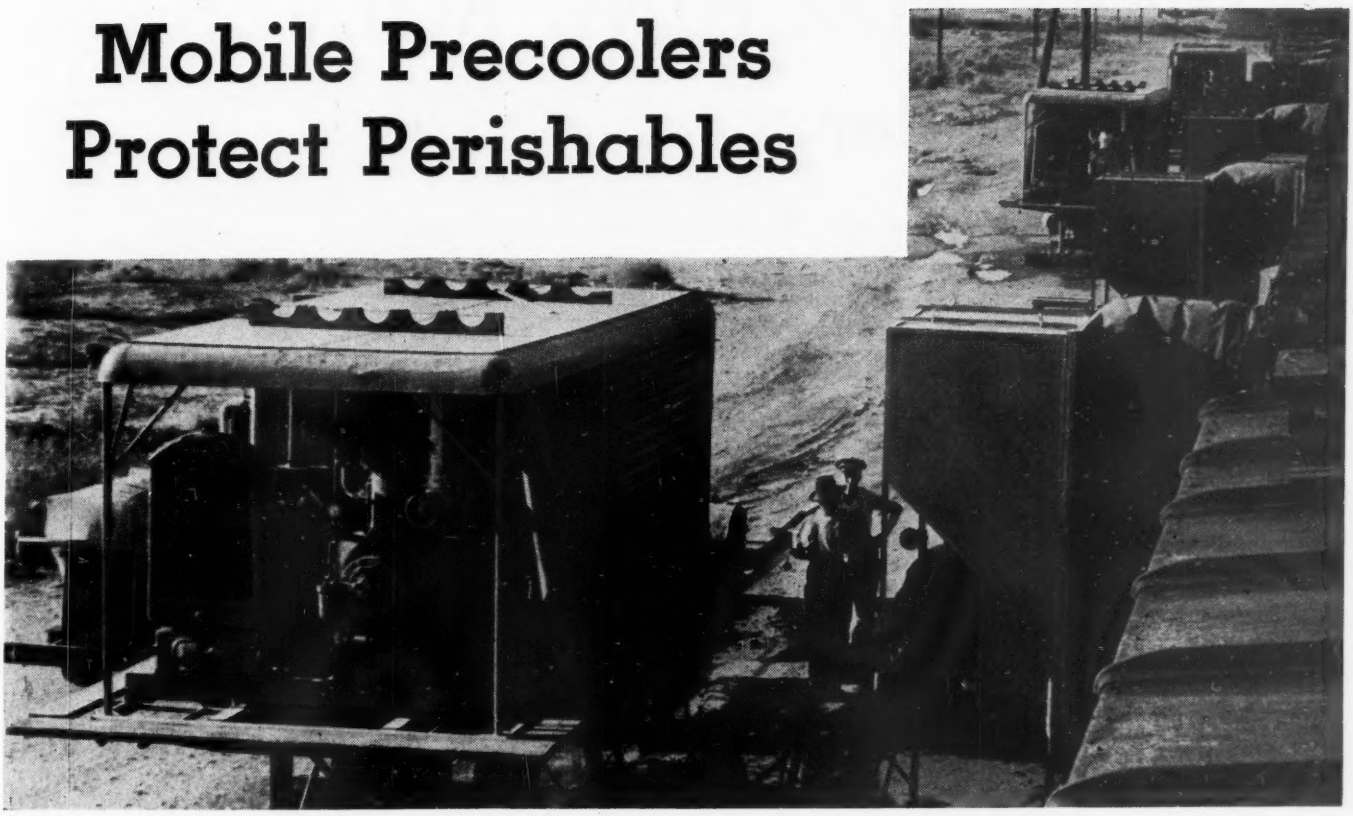
Another form of pressure, rather than collective, bargaining is illustrated by this 4-hour work stoppage of long line telephone operators, in New York, last October.

Mobile Precoolers Protect Perishables



Several mobile units precool group of cars, each handling three cars at a time.

By ROBERT A. LATIMER,
Fresno, Calif.

APPROXIMATELY 70 self-contained refrigeration units mounted upon semi-trailers and trucks have been used to precool fruit and vegetables shipped from western producing areas to eastern representatives. Operated by the General American Precooling Corp., these portable precooling units have been put into service for cooling grapes, celery, lettuce, strawberries, tree fruits and many other kinds of produce which must travel across country to reach embarkation points. Most present-day shippers specify the use of precooling in order to guarantee satisfactory arrivals.

The general practice is to cool the car and commodity to a temperature of approximately 36 to 40 deg. F., after which the car is iced and sent on its way. Time required for precooling varies from about 2 hours for strawberries to 16 to 18 hours for peaches or pears.

The precooling equipment ranges from small units that will cool only one car at a time up to installations that will cool 30 cars simultaneously. A typical unit consists of a 40-ton ammonia compressor plant, complete with condensing coils and butane-powered engine, mounted upon a 24-ft. semi-trailer frame. With this portable refrigeration plant are three cooling units consisting of a blower, coils and a canvas tunnel for attaching to a railroad refrigerator car. These units are transported on a semi-trailer, which is moved from one location to another by a heavy truck tractor. In practice, these units are installed at a predetermined location, such as a team track or adjacent to a shipper's packing plant. The three cooling units are spaced approximately 50 ft. apart alongside the railroad track and are connected by a portable pipe line to the compressor unit mounted on the trailer. The refrigerator cars, after loading, are switched to these units for precooling. The canvas tunnel, which is divided into two sections, is connected to the doorway of the refrigerator car. The equipment is then started up and blowers of approximately 12,000-c.f.m. capacity circulate cold air into the top of the car, down through the load and back into the evaporator unit through the bottom part of the canvas tunnel. The temperature and humidity are controlled automatically.

In location where the volume of shipping is not large, the smaller units which serve one car each are used. These are completely self-contained and are mounted on a standard truck chassis. They can handle two to four cars at various locations within the same day.

Vegetable Quick Cooler

For precooling leafy vegetables, such as celery, lettuce and cauliflower, General American Precooling has developed a cold-water-bath type of cooler. This consists essentially of a large vat containing a slow-moving conveyor on which the crates of vegetables are transported, the time of travel through one of these vats being approximately 20 minutes. The vat is filled with water which is circulated through refrigerated-coil tanks by large pumps and is then distributed evenly over the top of the vat through specially designed drip pans which allow the water to infiltrate down through the crated vegetables. The cooling coils are connected to a portable refrigeration plant similar to the 40-ton equipment.

This portable refrigeration equipment has reduced spoilage and guaranteed arrival of the perishables in better condition than before. Shipping costs have been reduced also, as it is not necessary to use as much ice in transit.

ROTARY MACHINE SOLVES Lye Peeler Problems

It eliminates objectionable features of conventional equipment. Satisfactory performance has been demonstrated. Details of construction are given

By F. H. THURBER and PHILIP W. BOHNE
Southern Regional Research Laboratory
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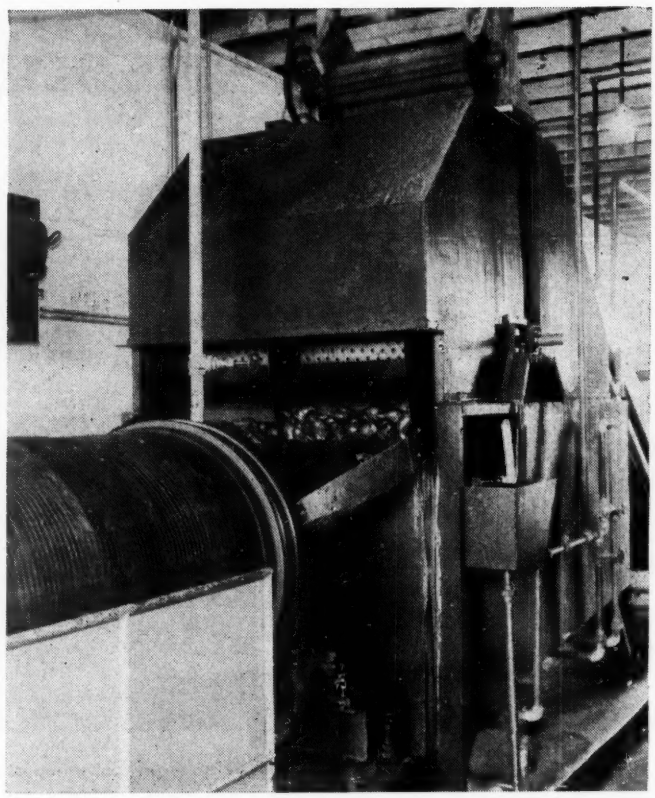

Rotary lye peeler in operation

EFFECTIVE and economical peeling, with minimum waste, is a major problem in the preparation of sweet potatoes and other root or tuber vegetables for dehydration or canning. One of the most widely favored commercial methods involves the use of a hot caustic soda solution to soften the unwanted outer layers so that they may readily be removed in a washing device. The peeler described was designed in an effort to eliminate some of the objectionable features of existing peelers.

This lye peeler was developed in connection with the design and adaptation of equipment for handling and preparing sweet potatoes for dehydration, in which application was made of data and experience acquired in handling and processing sweet potatoes for starch. Sweet Potato Growers, Inc., at Laurel, Miss., had been manufacturing starch from sweet potatoes, with the technical advice and assistance of the Southern Regional Research Laboratory. When this Cooperative initiated action, late in 1942, toward diversification of its undertakings to include dehydration of sweet potatoes for the armed forces, assistance was extended to include development of equipment for the dehydration plant. Particular attention was given to the peeling equipment.

Problems Encountered

Most of the sweet potatoes used for dehydration have been cured and stored. As a consequence, they have a rather thick, corky periderm layer under the skin. This complicates the problem of effective peeling without excessive waste. After a survey of available experience and observations, and some additional experiments, it was concluded that lye peeling offered the best promise of satisfactory results. Most of the equipment so far developed for performing the operation, however, seemed to leave much to be desired in respect to design and performance. Consideration of the problems involved in the operation and maintenance of lye peelers indicated that adequate design should incorporate, among other things, the following features:

1. A simple potato-carrying mechanism designed to prevent abrasion of the potatoes and to insure, by positive action, equal time of contact of every root with the lye. (The lye concentration is lowered by reaction with any skin or flesh material which becomes separated from the potatoes in the peeler and remains in the bath. If such material is kept out of the bath, the lye consumption is reduced.)
2. Total enclosure of the unit to eliminate spilling of hot lye and to permit adequate thermal insulation.
3. Simplicity, stability and compactness of design to insure low upkeep and operating costs, as well as to reduce floor-space requirements.
4. Removal of all bearings from contact with lye.
5. A variable-speed drive on the potato-carrying mechanism to adjust the time of retention for sweet potatoes of varying quality.
6. Automatic regulation of the bath temperature to keep it just below the boiling point and to decrease steaming and spilling of lye.

Different designs, varying from screw conveyors operating in cylinders to different types of conveying belts, were tried on a small scale. Most of the difficulties encountered in devising the kind of peeling equip-

*One of the laboratories of the Bureau of Agricultural and Industrial Chemistry, Agricultural Research Administration, U. S. Department of Agriculture.

ment required are due to the fact that the sweet potatoes are lighter than the lye solution. If a belt or draper conveyor is used, the potatoes must be carried on the under, rather than the upper, face of the belt, to keep them submerged. Consequently, some mechanical means must be provided to force them under the belt at the input end.

The principle of the rotary drum, with pockets on its circumference, promised to solve the problem. With proper design of the pocket separators, the buoyancy of the potatoes in the lye would keep them so confined that, as they entered, traveled through, and left the bath, they would be subjected to negligible abrasion against each other or against any moving or stationary parts of the machine.

An experimental model, incorporating the principle of the rotary drum, was assembled. Final adjustment of the details of the pocket design and other features was effected by actual trial. The results fulfilled all expectations. A full-size unit of the dimensions described below was constructed and installed with the initial equipment in the dehydration plant of Sweet Potato Growers, Inc. It was placed in regular service early in November, 1943. Since that time it has operated continuously during two seasons' runs with fully satisfactory performance. (An exterior view of the unit is shown in the photograph). Shortly after installation of this unit, a duplicate was installed in a local cannery at Laurel, where equally satisfactory results have been obtained.

How It Is Built

The rotary peeler consists of a rotating horizontal perforated drum, with suitable vanes so mounted between flanged ends as to provide a series of pockets on the outer surface. This drum is mounted above a lye bath in such a manner that about one-third of the circumference of the cylinder dips into the lye. As shown in the drawing, washed potatoes are delivered to the top of the drum by means of an elevator. As the drum slowly revolves, the pockets carry the potatoes into the hot lye and keep them in regular order until they emerge from the bath. They are discharged on the opposite side. It has been found necessary, in operating on sweet potatoes and Irish potatoes, to vary from time to time the temperature of the bath, the concentration of the lye and the time of immersion.[1] This is necessary to meet the requirements of different lots of raw materials. The peeling characteristics of the raw stock vary considerably with their origin, this length, kind of storage and so forth. The temperature of the lye bath is generally held around 200 deg F. for new stock, and around 235 deg. F. for old stock from storage. The lye concentration[1] is kept at about 25 percent, and the immersion time is from 2 to 3 minutes for sweet potatoes and from 1 to 1½ minuts for Irish potatoes. Until the potatoes reach the lye, they are held in the pockets by means of a retaining shield placed around this section of the drum. The vanes forming the partitions between the pockets are set at such an angle that the heavy solution raises the potatoes toward the drum instead of pushing them against the shield. Consequently, there is no abrasion of the potatoes. The shield is discontinued at the point where the potatoes are entirely submerged in the lye, except for narrow extension strips along the edges of the tank, wide enough to extend to a point just below and inside the flange of the wheel. The resulting opening permits the hot solution to circulate freely in the mass of potatoes. Vertical pieces of perforated sheet iron are welded along the four sides of the opening to form a "skirt." The skirt retains any stray potatoes which may be dislodged by any "bumping" of the lye, due to the steam coils, until the next pocket of the paddlewheel can pick them up. The outlet for the potatoes is only a few inches above the surface of the lye, and the retaining arc on the discharge side of the drum is made very short to minimize abrasion.

Other features of the peeler tank include a sloping bottom, a bolted panel back, which is completely removable, and 4 in. of rock wool insulation on the sides to minimize heat losses. The tank is completely covered by a hood, fabricated in two sections. Lye is pumped from a makeup tank through a nipple, welded into the hood. There is a lye outlet line and a 6-in. cleanout plug. At the deep end of the peeler. The lye level is maintained by an overflow weir, 4 in. wide, in the side of the tank.

The peelers installed at Laurel have an estimated minimum capacity of 50 tons of sweet potatoes per 24-hour day. The drum is 4 ft. wide and 4 ft., 10 in. in diameter; it carries 24 pockets, 10 in. in depth. The vanes, forming the partitions between the pockets, consist of plates bent at an angle of 135 deg., so installed that the longer legs extend outward and slope away from true radii at a pitch of 1 in 10. The minimum slope of the partitions at the discharge point is 35 deg. with the horizontal. The whole wheel is mounted by anti-friction bearings on the A-frame, which is also one of the structural members of the tank.

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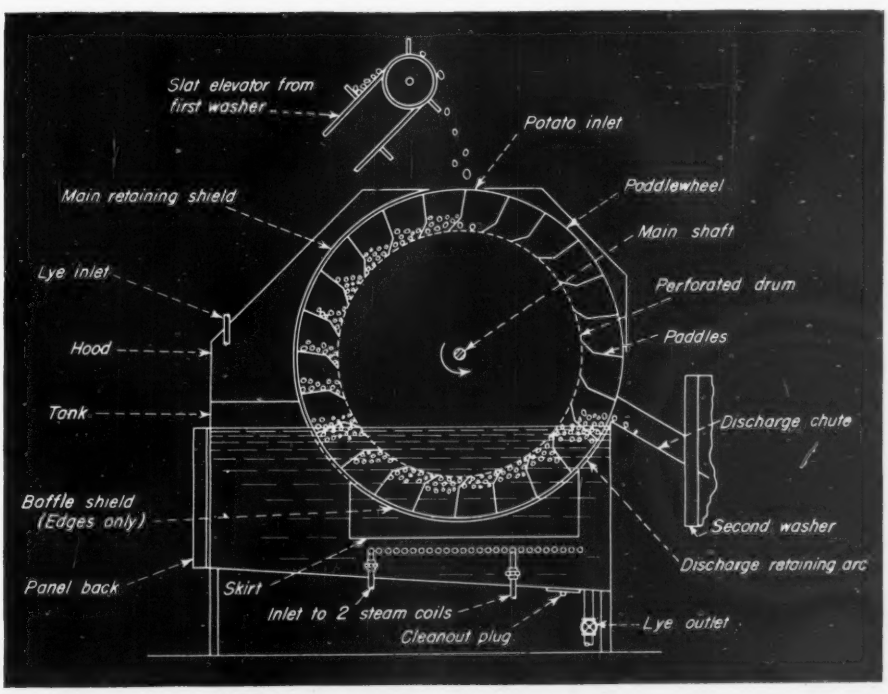


Construction details of rotary lye peeler.

COMMON AILMENTS Of Quality in Processed Foods

Taste, odor and appearance of many types of products are affected by same enzymatic and chemical reactions, calling for a "broad outlook" on part of food technologists. Control of amino-aldehyde reaction is pressing problem

By C. W. KAUFMAN, Assistant Manager,
Research and Development Department, General Foods Corp., New York, N. Y.

ONE of the major contributions that a large industrial laboratory can make to food knowledge is what might be called "the broad outlook." For example, an industrial operation may cut across many different fronts of the food industry. Research efforts and research perspective in the large laboratory tend to take on a broad overall pattern, conditioned by a common problem in several fields. Attention is thus focussed on classes or groups of reactions, storage changes, and so on, which are common to various kinds of food products, and which differ only in degree of manifestation as a result of such inherent product variables as pH and concentration of reactants.

Common Reactions

Enzyme changes, oxidative or otherwise, are examples of a class reaction common to most natural food products. In frozen and dehydrated foods generally, they make themselves manifest by the development of off-flavors, off-odor and off-color in the processed product. The food industry first recognized this problem during the last war. Up to then, it had not been aware of these changes because sterilizing processes were, in general, ample for enzyme inactivation by heat. When the food industry converted to drying without blanching, however, the problem became acute, thereby giving dehydration its first black eye. After World War I, frozen food development lent incentive to the development of blanching technics and control measures. In frozen foods, enzyme control is a "must," and the data built up for this operation are to a large degree those being applied in the dehydrated food industry today. We, as an industry, have been fully conscious of this problem in both frozen and dehydrated foods. But those are not the only fields where enzymes are a problem.

I mentioned the need of a broad approach to our problems. Here is an illustration: We recently had several complaints that some flavored starch puddings failed to set when cooled. A thorough check of the situation brought to light the fact that one ingredient of a flavor, purchased from an outside source, was being prepared from raw material purchased in Mexico. The Mexican material showed positive diastase action which partially liquefied the pudding starch during cooking. Now our "broad approach" includes diastase tests on the flavor mix, the last place one would look for such enzyme troubles. It's a long jump from frozen and dehydrated foods to starch pudding mixes, but similar problems may arise, and enzyme reactions must be controlled wherever they are found.

Another general deterioration type of reaction is that which may take place during storage between various components of certain compounded mixtures. It may seem a far stretch of the imagination to class baking powder with dehydrated eggs. However, the U. S. Quartermaster Corps Subsistence Research Laboratory and its allied organizations have demonstrated the effect of moisture on dried egg and soup stability, as evidenced by the reductions in permissible moisture allowed in QMC specifications of recent issue. We have been fully aware, for some time, of the effect of moisture in promoting a reaction between the components of baking powder, resulting in a product of inferior leavening action. In recognition of this, the specifications for ingredients and packages are carefully designed to limit moisture content and to offer maximum protection.

Off-flavors, odors, and so forth, are important in such products as gelatine desserts, pie filling and prepared cake mixes, and usually can be attributed to the presence or pickup of excess moisture. The point of all this is simply that there is a parallel between the reactions that take place in the things *we* put together and those *nature* puts together. We can use this broad observation in furthering research. Of course, in our physical mixtures an important factor is intimacy of contact between two reacting agents. Mechanical ingenuity has aided research here by tableting one ingredient, by increasing particle size or by using coatings to reduce the degree of contact. Unfortunately, nature isn't so cooperative.

Amino-aldehyde Reaction

Nature can be decidedly uncooperative at times. Note the frequency with which she has placed amino acids and aldehydes in close contact in a wide variety of animal, dairy and vegetable products. The more we see of food products, the more we become convinced that this one reaction, in its many complex forms, is the basis for much that is good and evil in the food industry.

For the good side, this reaction is probably responsible for many of the soul-satisfying flavors we like so well. It is, for instance, the key to many of those distinctive flavor differences that add variety to our breakfast foods. Except for that, there would be little but form and color to differentiate between the various cereals.

In the course of some work which we were doing on a new breakfast

food, we developed a very pleasing characteristic flavor. It subsequently turned out that this was a time-temperature-humidity reaction, and a variation in any one factor changed the flavor. When we used the wrong type of sugar, we had most unpleasant results. When you add the factor of sugar type to time, temperature and humidity, you have a tricky control problem for a chemical reaction. In our experience, most of the good amino-aldehyde reactions are like that.

The Bad Ones

The objectionable changes due to this reaction may outnumber its good contributions, and a generally applicable method of control is the most important problem faced by the food industry today. These changes always, in our experience, have taken the form of (1) a darkening of the product, (2) the development of a bitter, caramel-like flavor and (3) an equally bitter or unpleasant odor. To date we have observed this undesirable reaction in dehydrated citrus juices, potatoes and other vegetables, baked beans, soup, cereals, fish, meats and coconut. Others have recognized it in milk products and even in wines. The degree to which it is present and the rate of development depend upon the moisture content, concentration of reactants, oxygen content, temperature of storage, pH of products, and so forth.

In our own laboratories we have attacked this problem in two ways:

I. Our basic research group has proceeded from the premise that a study of the reactions between individual amino acids and individual carbohydrates would ultimately develop a sufficient understanding of the reactions involved so as to enable this type of change to be controlled much more rationally than at present. In a sense, this may be considered the synthetic approach, inasmuch as the objective of controlling the positive development of desirable flavors is just as important to this program as the negative control of the reaction to prevent the formation of flavors that happen to be regarded as undesirable. In the course of this program, many hundreds of tests already have been made, each test generally involving only one amino acid and one sugar. In this way, most of the simply binary mixtures which are possible between the known amino acids and the known simpler carbohydrates have been reacted under at least one set of conditions. The field is still far from covered, and the following conclusions must be regarded as tentative.

Conclusions Drawn

1. In many instances the development of flavor is rather specifically dependent upon the particular amino acid that participates in the reaction.

2. The reactivity of the sugars generally parallels the reactivity of these compounds in other respects. The aldopentoses, for instance, react more rapidly (or at a lower temperature) than the aldohexoses, and these, in turn, more rapidly than the di-, tri- and poly-saccharides. Carbohydrates having a free aldehyde or ketone group naturally react more rapidly than those that first have to be hydrolyzed or otherwise broken down to release these groups.

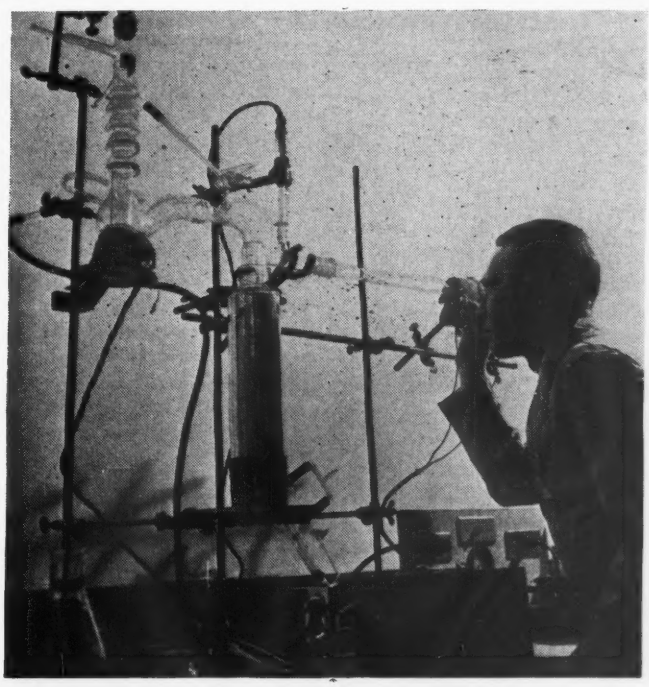
3. The overall reaction of the amino acids and sugars appears to be a very complex series of stepwise reactions about which very little is known, except that the reaction mixture becomes more acid. Carbon dioxide is evolved under some conditions, and an aldehyde corresponding in structure to the amino acid used, but it contains one carbon atom less (through loss of CO_2), is sometimes formed in significant amounts.

Forms Water

4. At elevated temperatures, large quantities of water are formed in proportion to the number of amino acid molecules entering into the reaction. In some respects, it appears that the amino acid is acting as a catalyst in the dehydration of carbohydrate.

5. There appears to be a high degree of specificity in the kinetics of these reactions. For instance, the reaction characteristics of a given pair of reactants, in the dry state, cannot be used to predict with assurance the characteristics of the same pair reacted in aqueous solution. Dipeptides also participate in this type of reaction, but their rate of reaction may be either greater or less than that of the component amino acids.

Testing Army dessert which could be made up in the tropics.



Flavor-changes are studied by the high-vacuum reflux technic.

6. Measured by color development, sulphur dioxide is still the best known inhibitor of these reactions.

II. Our technology group has endeavored to find solutions to specific product problems as they arise, utilizing all of the information available from the literature, or from our own basic research. As an example, in cereals, packages that breathed, yet provided good moisture protection, have disposed of off-odors that otherwise would mask the pleasant flavors. This was a simple one, but nevertheless important. In a more complex problem, it appeared that dehydrated vegetables, soups and baked beans all fell into the same class. At least we knew that with each of them we got the characteristic dark color, dark flavor and off-odor. In addition, we had a problem very close to our own hearts, desiccated coconut, representing our first acquaintance with this type reaction. Here the reaction takes the form of producing saffron yellow coconut—an unsalable item.

Desiccated Coconut

At this time, our work on desiccated coconut is essentially completed. It might be summarized in the following way:

1. A reduction in moisture level retards, but does not stop, the yellowing action. This statement should be qualified by our practical limitation; namely, the inability or impracticability of drying below 2 percent moisture for general-purpose use.

2. A shift in pH toward the acid side retards, but does not stop, the reactions.

3. An increase in either invert sugar, protein or amino nitrogen accelerates the reaction. Histologically, it has been established that invert sugar and protein decrease on ripening of the coconut. A correlation between analytical factors, maturity and rate of yellowing has been established.

4. Partial removal by leaching, oxidation, fermentation, and so forth, of either amino nitrogen or invert sugar retards the reaction, but by all technics used to date, has so altered the flavor of the product as to make application impossible.

5. Among all chemical treatments tried, sulphur dioxide in concentrations of less than 300 p.p.m. effectively prevented the reaction from occurring.

Two things should be noted with respect to sulphur dioxide. It is not serving as a "bleach" or a "preservative." Rather, it *prevents* yellowing instead of *reducing* yellowing after it occurs. In other words, its use permits the delivery to the consumer of the original optimum-quality product. Secondly, its protective effect here in no way implies yeast and mold control, as was so often credited to the dried fruit industry. Actually, its application in the dried fruit industry for similar controls is just as valid, since the same reaction plays equal havoc therein.

Dehydrated Tomatoes

As an even more complex example, we selected dehydrated tomatoes for study. We recognized that really two chemical changes were involved in the storage effects noted on this product. In addition to the bitter dark complex developing in the serum, this development is often preceded or paralleled by the appearance of the "hay" flavor and odor so characteristic of some of the highly pigmented vegetables. One reaction is apparently catalyzed by the other. As a result, dehydrated tomatoes have an extremely short shelf life. Because of its delicate nature, the product is also extremely heat sensitive, and overheating during drying appears to markedly accelerate the off-flavor changes in storage.

In the course of this work, studies have encompassed the development of testing methods, the effect of ammonia, pH, heavy metals, peroxidase, decolorizing carbon, silica jel, ion-exchange materials, semicarbazide, and so forth, on the reaction. The properties of rapidly aged serums have been studied analytically and spectrographically. In many instances, efforts to duplicate the natural results have been made with synthetic compositions. Such treatments as alcoholic precipitation, fermentation and dialysis have been used as tools.

While much of this work is still going on, it may be summarized by saying that sulphur dioxide has been found to provide the necessary control.

Summing up all of our observations, we believe that we are warranted in concluding that these complex amino acid-aldehyde reactions can be controlled, in general, by the use of sulphur dioxide in quantities of less than 1,000 p.p.m., thereby delivering to the eventual consumer a product superior to that which she would otherwise obtain.

Dehydrated potatoes lend themselves to similar control. In addition, an improved vitamin retention was noted.

In addition to its effect on tomato color, we encounter the disastrous effects of oxygen on many other fronts of our broad research field. Everyone is, of course, familiar with its effect on fats and oils in promoting fat rancidity. However, the same problem in somewhat different form is common to many food fields, especially to those wherein processing has disrupted or disturbed the normal chemical combinations in a product.

A problem of this nature, from our experience, pertained to cereals. The processing of normally stable products such as corn, wheat and rice makes them extremely susceptible to oxidative rancidity, although the off-flavor developed is somewhat different from a truly rancid fat. Here the chemists' headaches start, because we have evidence to show that this type of deterioration is promoted by low moisture and discouraged by high moisture. Yet to be crisp and palatable, cereals and prepared breakfast foods must be of low moisture. In addition to moisture, the type of process and the presence of catalyzing trace metals will encourage this development. Early in the war, the Army expressed an interest in a pre-mixed cereal—one containing, in addition to the breakfast food, dried milk and sugar suitable for preparing a ready-to-eat product by simply adding water. To our surprise, the mixture went rancid regardless of our regular efforts at control. We finally solved the problem. The answer was to add *more* fat to the mixture. The same technic has since been demonstrated to work on other things. For example, in products like prepared flour mixes, alum-type baking powders tend to catalyze the fat of the flour so that it becomes rancid. Fat is present to less than 0.3 percent in the flour, and the addition of 2 to 3 percent of extra fat will stabilize the mix in much the same manner as for cereals.

Molasses for Beans

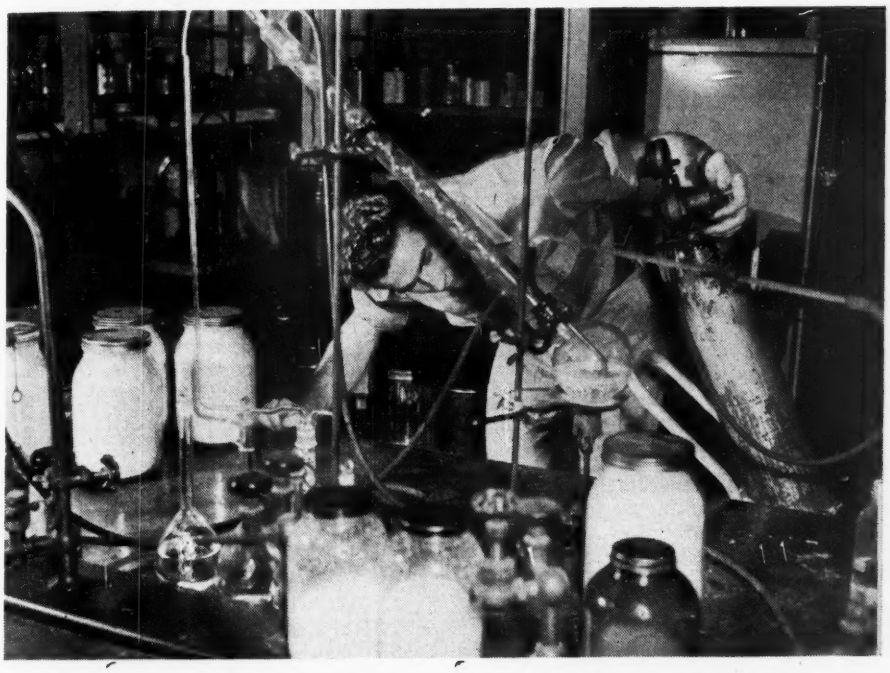
A related problem, but with a different kind of answer, arose in connection with dehydrated baked beans. The pork used introduced a rancidity problem. Now it so happens that in recent times it has become the custom with some manufacturers to use brown sugar in the canned product rather than bother with the old-fashioned molasses. Of course, sealed in the can, the salt pork keeps well. For the dehydrated product, however, the Army (on the basis of storage tests) specified that the fat be from a stable shortening rather than salt pork. In our own effort to

produce a superior quality and flavor, we used salt pork and real old-fashioned molasses. After two years, the product still shows no sign of rancidity. In this case we attribute the protection to the molasses.

Precooked Rice

Another dehydrated specialty, which we have been supplying the Army in considerable quantity, is precooked dehydrated rice. In order to meet Army requirements it was necessary to dry the rice below our "safe" moisture level. However, in conjunction with the high-fat pork with which it is mixed in the preparation of an Army ration, there has been no evidence of rancidity. Incidentally, we wondered why precooked rice went rancid, while raw rice didn't. The normal moisture level of raw rice is 12 to 14 percent; of precooked rice, 6 to 10 percent. If both are held at 12 percent, neither go bad; if both are dried to 8 percent, both go bad. Once again, there is a lot to be said for working as near to natural equilibrium conditions as possible for best storage results.

There are, of course, two other common ways of controlling off-flavors and odors due to oxidative deterioration. In the case of foods like coffee and roasted nuts, one procedure is applied; namely, the product is promptly packed under vacuum to eliminate all contact with oxygen. Shortenings, fat, and the like, have been stabilized by the addition of chemical antioxidants. Much remains to be done in the latter field on the application of such materials to low-fat systems. Their addition, for example, to dehydrated tomato juice and their use in controlling off-flavors in canned and frozen juices appear to show considerable promise. But new technics of selection and evaluation are needed, aside from those already developed for straight fats.



Checking the "browning reaction" in cocoanut at the central laboratories of General Foods Corp. A reduction in moisture level retards, but does not stop this browning action.

Staling of Starchy Food

Another type of general deterioration, not limited to one field of foods, is the quality degradation we recognize as staling, or retrogradation of starch. We are all familiar with this in bread and crackers. In our own work, we have also found it developing in dehydrated precooked rice and dehydrated baked beans. In these products, it takes the form of flavorless mealy character, or texture, in the mouth when eaten, and fortunately only occurs on extended storage. It is probably due to gradual crystallization of straight chain starch molecules. This type of change seems to be accelerated by high moisture, and it occurs irrespective of temperature. We have observed it in canned rice, wheat, and the like. We are also confronted with it in the canned breads that we are now investigating for the Army. The type of starch is important. For example, we have never encountered this type of change in tapioca or other waxy starches, although normal corn and sorghum starches processed in the same equipment showed some evidence of retrogradation.

Denaturization

We have one more reaction that is worth careful consideration from a processing standpoint. I refer to certain irreversible changes occurring in proteins and cellulosic materials when improperly dried. We have all recognized for some time the danger of overdrying as related to high protein and cellulose foods which "caseharden" readily. This usually shows up in the final product as a loss of ability to rehydrate properly, or to swell or whip as the original material may have done. In work on dehydrated fish, and subsequently on other products of like nature, we have observed that when these materials are dried alone, drying temperatures for very best results must be so low as to be inefficient or hazardous. If dried at high temperatures, the material is readily case-hardened, with a marked loss of natural properties.

If the desired product is one that will permit of admixture with other nondenaturable materials (such as sugar, starch or cereals), the time of drying and the subsequent storage ife can be materially improved. At the same time, the natural properties are maintained to a much greater degree in both the original and the stored material. From the standpoint of cellular material, this principle was demonstrated to be especially true in work which we carried out on dehydrated pickles. Here, dehydration in the presence of sugar was the difference between satisfactory and unsatisfactory reconstitution after a period of storage of a few weeks. In the case of spray-dried eggs, the addition of sugar produces a product having the normal egg "lift." In the absence of sugar, no "lift" is noted.

Summary

In summarizing, it would appear that there are certain general deterioration reactions that apply rather broadly to many types of dehydrated and other food products. Among these may be included enzymatic changes, chemical reactions, rancidity changes, retrogradation and denaturization. Of these, probably the most prevalent in dehydrated foods is the amino-aldehyde type of chemical reaction producing a bitter flavor and a dark color on storage. Control of this reaction is easily the most important broad quality problem faced by the food industry today.

Lecithin Increases the Effect Of Shortening in Bread

By D. B. PRATT, Jr., Director of Laboratories, B. A. Eckhart Milling Co., Chicago, Ill.

Research removes some uncertainties about use of lecithin in bread. It improves handling qualities of dough but does not change its consistency. Nor does it impair fermentation. Crust, texture, shape of loaves improved

SHORTAGES of milk and fats caused American bakers to turn to other products as a means of extending their supplies of these ingredients. Foremost has been the search for a product that would not impair the quality of baked goods, yet would give relief from the shortages of bread ingredients. A natural trend has been toward the use of soybean products, either in the form of high-fat flour or byproducts of the soya oil extraction industry. One of these latter products is lecithin.

Usage of soya flour from the standpoint of maintaining quality is difficult, although the nutritive basis for such a practice is sound. On the other hand, lecithin has been marketed and has been used by bakers for several years. It has been generally accepted as an "optional ingredient," although the benefits from its use were subjects of argument. The use of lecithin in bread has been given some research study, but from a practical standpoint most conclusions drawn have been conflicting and vague.

Our study of the subject was undertaken to clear away at least a few of the uncertainties connected with the use of lecithin in bread, principally from a practical standpoint rather than from the viewpoint of academic research. No attempt was made to study or account for the interface modifying phenomena attributed to the lecithin other than to note the end results of this action.

Our practical studies were conducted to determine:

1. Amounts of lecithin for maximum benefit.
2. How to incorporate it into a dough.
3. Effect of lecithin on mixing, fermentation, volume of the loaf and keeping qualities of the bread.

The procedure used involved:

1. Making of recorder-mixer curves.
2. Making of baking tests, use of various types of flour.
3. Use of various shortenings.

Our results showed that:

1. Addition of lecithin increased the effectiveness of the shortening used.
2. Maximum beneficial results were obtained when 0.25 percent of lecithin was added.
3. Method of incorporating the lecithin is flexible and a matter of personal preference.
4. Presence of lecithin does not affect dough consistency but does modify dough conditions during mixing.
5. There is no adverse effect of lecithin on fermentation.
6. Addition of lecithin improves the handling properties of doughs.
7. Proof and baking time are not affected.
8. There is little or no effect on volume.
9. There is a beneficial effect upon crust properties, crumb texture and grain, external appearance and keeping quality of the baked loaf.

Effect on Mixing

Preliminary to studying the actual baking effects of lecithin, several series of recording-mixer studies were run. These series were planned to include four different flours:

1. Soft wheat cracker flour.
2. Hard wheat family flour.
3. Hard winter wheat bakers' flour.
4. Spring wheat flour.

Each series was divided into two sets of curves:

1. Flour-water doughs plus lecithin.
2. All-ingredient doughs plus lecithin.

Each set of doughs was put under test to determine the effect of the lecithin on the mixing behavior of the flour. Different increments of lecithin were used. All of the doughs were mixed to have a uniform water content, and were examined on removal from the mixing bowl for

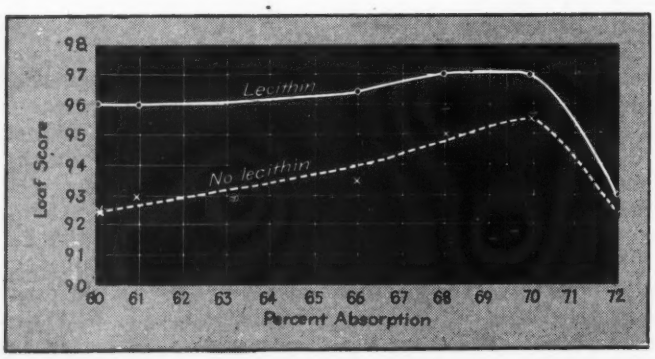


FIG. 1. Lecithin shows slightly less beneficial effect upon loaf score at high percentages of added water. But doughs containing it are less difficult to handle. "Percent absorption" is the amount of water, based on weight of flour.

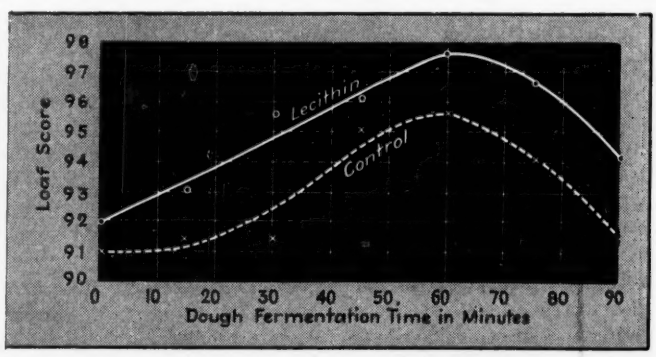


FIG. 2. Addition of lecithin to bread doughs shows no change in relative beneficial effect upon loaf score of the bread over that of bread from no-lecithin doughs which are subjected to varying fermentation time

signs of lubricating effect of the lecithin, as well as for general condition of the dough.

Interpretation of the curves and of the tabular data from them was based both on the experience of the operator and later were confirmed by baking tests. However, certain definite points were looked for in the curves that perhaps need clarifying. The wheats, from which the flours used in the tests were made, were blended to give a definite mixing-curve pattern, principally a curve that had as short a development time as possible and yet retains a long tolerance or peak. Lessening the development time by the inclusion of lecithin would be a desirable effect for the baker, as would an increase in mixing tolerance. That means that the most desirable point on the lecithin curve would be reached when the effect on development is at a minimum and the extension of tolerance is at a maximum.

Curves and tabular results of the soft wheat series showed little influence of lecithin in flour-water doughs except that tolerance was increased slightly, the maximum increase being noted at 0.25 percent of lecithin. In the all-ingredient dough curves, the maximum increase in tolerance was noticed at the same increment of lecithin.

In the low-protein hard wheat series with flour-water doughs there was a slight decrease in initial development time and a slight increase in tolerance only at the 0.5 percent level of lecithin. In the curves for all-ingredient doughs, the effects were, however, more consistent, and the shortening of development time and increase of tolerance reached a maximum at the 0.3 percent level for lecithin.

With the 12 percent protein bread flour from winter wheat, there was no noticeable influence on tolerance in either the flour-water or all-ingredient dough curves. Development time was, however, shortened to a minimum with 0.3 percent of lecithin. A new factor was observed in the amplitude or breadth of the up and down pen strokes on the curves. This amplitude increased to a maximum at 0.25 percent and then fell off at higher levels. The feel of these doughs on removal from the mixer indicated that more elasticity had been achieved by the presence of lecithin.

The spring wheat flour fell into the same lecithin values as did the winter wheat, with little effect noticeable on the flour-water doughs.

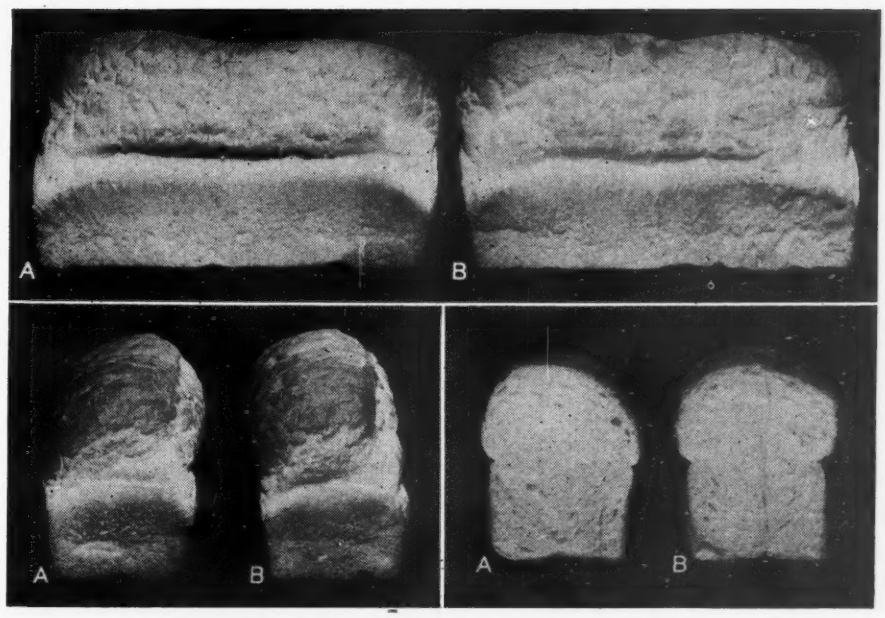


FIG. 3. Side, end and cross-section views of loaves, (A) containing no-lecithin and (B) 0.25 percent lecithin based on weight of flour used.

Where the dough was completed with the addition of bread ingredients, the development time was noticeably shortened. Also, the amplitude of the curves was lessened by the addition of the lecithin. This flour was extremely elastic and rubbery, but the lecithin mellowed this condition and gave a very smooth-feeling dough.

From a study of the mixer curves, a level of 0.3 percent of lecithin generally would be indicated for optimum influence in mixing. The curves also indicate other factors:

The addition of lecithin itself does not change the maximum height of the curves from the base line. This indicates that lecithin does not change the consistency of the dough, although the doughs containing lecithin had a drier feel. A second factor lies in comparing the amplitude of the spring wheat flours to that of the winter wheat flours, both with and without lecithin. In the case of the relatively short gluten of the winter wheat, the addition of lecithin increased the extensibility or elasticity of the dough, particularly in the presence of all dough ingredients. Likewise, in the case of spring wheat flour, the presence of lecithin affected the amplitude of the curves, but in an opposite direction. The extreme extensibility of the spring wheat gluten was shortened somewhat, indicating that lecithin had a mellowing effect. These conditions might have a neutralizing influence on strong or weak glutens. The lecithin definitely improved mixing qualities by boosting the elasticity, or extensibility, of the winter wheat and neutralizing some of the rubberiness of the spring wheat. This same effect was present to a lesser degree in the soft wheat and 11 percent protein hard wheats. But since neither are intended for bread production, there is no great significance for the bread baker here.

Baking Tests

All baking tests were run on a standard commercial formula employing both straight- and sponge-dough procedures. The formula contained 4 percent sugar, 4 percent milk solids and 3 percent shortening. In the sponge-dough procedure, the sponge contained 60 percent of the total flour. Fermentation, proof, and baking time and temperatures were held constant throughout, except when one of these factors was the variable in the work. All loaves were scaled at 500 grams and measured for volume immediately on removal from the oven.

Table I—Results of Compression Tests To Indicate Keeping Quality of Breads Under Test.

Elapsed Time	Control (3% shortening)	0.25% lecithin (3% shortening)	0.25% lecithin (1% shortening)
1 hr.	60- 64*	52- 56*	59- 65*
24 hr.	90- 90	87- 83	89- 93
36 hr.	134-130	130-128	135-130
48 hr.	196-200	180-192	198-200
72 hr.	305-315	290-285	308-320

* Values are seconds required to give 1 in. of compression with 200 grams of weight.

Unwrapped loaves were stored overnight and scored the following day by American Bakers' Association method and values. This procedure was modified by adding a plus or minus to the value when a minor difference existed, avoiding a wide range in scoring. Otherwise the scoring might have classified some loaves in an unsalable bracket.

The total scores are shown graphically. The first series of bakings (Fig. 4) was to determine the proper amount of lecithin to use. Twelve doughs were run (six doughs in duplicate) containing 0, 0.1 percent, 0.25 percent, 0.5 percent, 0.75 percent and 1.0 percent of commercial-grade lecithin (based on weight of flour used). From the results of this bake, it was concluded that 0.25 percent gave the peak score with lecithin. This level was employed in all remaining bakes.

There was a noticeable difference in the handling properties of the doughs when the lecithin contents were increased. The elasticity increased at each level up to and including 0.5 percent, but beyond this range the dough had a denseness that was undesirable.

A second series of bakes (Fig. 5) was run to study four different means of incorporating the lecithin:

1. Lecithin in the sponge with the flour.
2. Lecithin in sponge with small ingredients.
3. Lecithin in dough with the flour.
4. Lecithin in dough with small ingredients.

In these bakes, the total scores were very close together. But in duplicate bakings, the incorporation of lecithin in the dough with the small ingredients seemed to give a very slight edge over other means.

A third bake (Fig. 6) was run to determine the proper carrier for the lecithin. Altogether six means were employed, although only four of these are reported here. The other two means (using acetone and Carblex) were not satisfactory as far as bread produced from them was concerned. Where a flour carrier was used (6 percent lecithin sprayed into the flour) water content was adjusted 1 percent for each 1 percent of lecithinated flour. As the scores indicate, there is no apparent "best way" to incorporate lecithin. The writer favors the flour carrier solely because it is a dry ingredient and somewhat easier to handle.

The next series of bakings was to study the effect of lecithin on the water absorption and handling properties of dough, using 0.25 percent of lecithin. Ten doughs were run at absorption levels of 61, 66, 68, 70 and 72 percent of flour (by weight) against controls containing no lecithin. Fig. 1 shows the comparative bread scores. Normal absorption on this flour was 65 percent.

Particularly notable in the scores, as well as in handling properties, was the effect of the lecithin. The stiff dough (61 percent absorption) without lecithin was putty-like, while with lecithin the same dough was elastic and lively. Likewise, at 70 percent absorption the difference in handling was evident. Without lecithin, the dough was soft and slightly sticky. With lecithin, the dough was soft but dry and very easy to handle. At 72 percent absorption, both doughs were difficult to handle.

A study of the influence of lecithin on fermentation was the object of the series shown in Fig. 2. Sponge doughs were run, and at 15-minute intervals pieces were scaled, molded, proofed and baked in the usual manner. The youngest dough had only 15 minutes of flour (fermentation) time, while the oldest one had 1¼ hours of floor time. The lecithin did not seem to hurt or help the tolerance, although the lecithin doughs scored higher throughout the series.

The final study was one on keeping quality. A rather crude method was devised for this study. But it apparently was effective because it verified the differential that was noticeable to the touch. The bread was stored, unwrapped, under uniform conditions in a conventional bread box. The bread box was stored throughout the tests in a Bailey-Despatch fermentation cabinet with temperature at 83 deg. F. and ordinary room humidity. At periods of 1, 24, 36, 48 and 72 hours, the loaves were removed from the box only long enough to cut a slice exactly 2 in. thick from each. The crust was removed from the slice and a piece of transparent plastic placed over the surface of the slice. In the center of the plastic sheet were placed two 100-gram weights, and the elapsed time in seconds was observed until the 2-in. slice was compressed to 1 in. thickness.

In the compression tests three formulas were employed: (1) Control containing 3 percent shortening; (2) containing 0.25 percent lecithin and 3 percent shortening; (3) containing 0.25 percent lecithin and 1 percent shortening. The readings obtained on duplicate determinations are given in Table I.

Where lecithin was added to the control dough, better keeping properties were evidenced. When lecithin was used with reduced shortening, the keeping qualities were approximately equal to those of the control dough with 3 percent shortening.

Shortening Studies

Some work was done on the shortening extension effect of lecithin. The preliminary studies were made with the National Manufacturing Co. recording dough mixer. And we employed a control series containing from 0 to 6 percent shortening or corn oil, and two other series of identical nature except for the addition of 0.15 percent lecithin in one series and 0.3 percent lecithin in the second series. These curves were

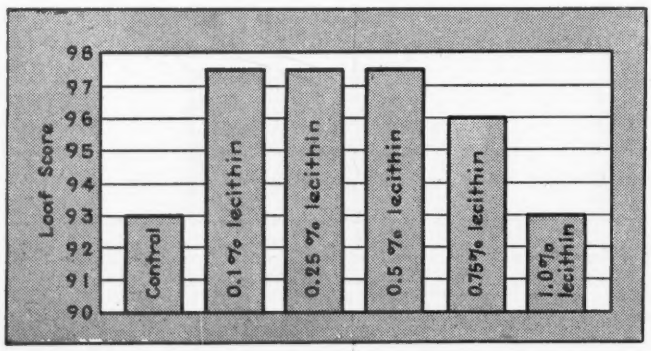


FIG. 4. Effect of varying quantities of added lecithin upon loaf score. (Percent based upon weight of flour used in dough.)

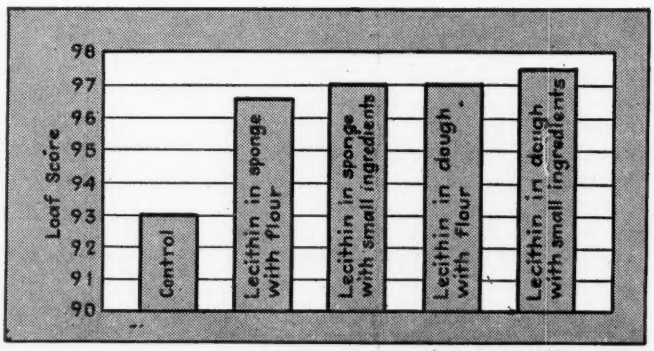


FIG. 5. Effect upon loaf score of adding optimum quantity of lecithin to bread dough in varying manner.

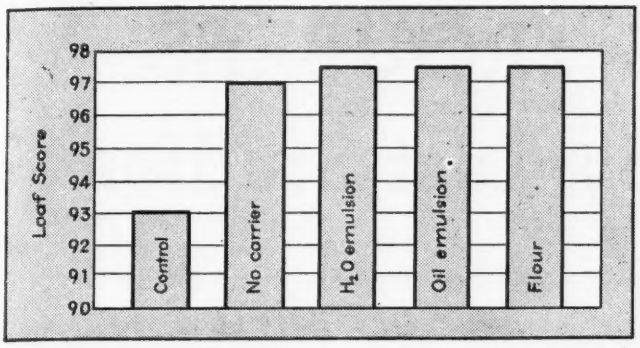


FIG. 6. Effect upon loaf score of adding optimum quantity of lecithin to bread dough direct and by means of three different carriers.

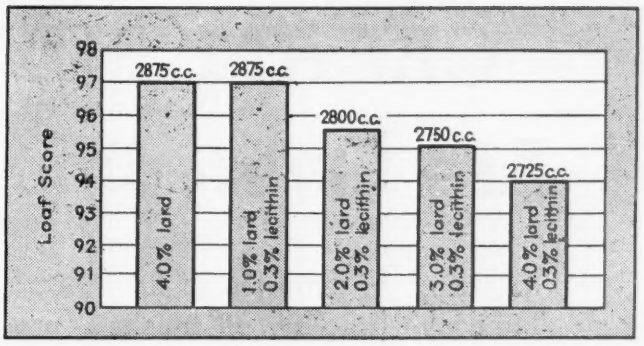


FIG. 7. Comparative effect of varying quantities of shortening with and without added lecithin, upon both the loaf score and the volume of the bread produced.

based upon simple flour-water-shortening mixtures.

The effect of shortening in bread is twofold. Of primary importance is the increase in tenderness and keeping properties of the finished bread. The other effect is apparent in the mixer, where the shortening increases the time necessary to fully develop the gluten. Demonstrated in the mixer curves, this is a lubricating action. Its value is doubtful as far as development time alone is concerned, but it increases the tolerance to the 3 percent shortening level, above which a decrease in tolerance sets in. There also is a broadening of the development-breakdown angle.

When lecithin was incorporated with the oil, the effect of the lubricant on development time was minimized. But when a hydrogenated shortening was employed, the development time was extended slightly. This may have been because corn oil and lard, due to their more fluid state, were dispersed more rapidly throughout the dough. Lecithin broadened the development - breakdown angle somewhat, but there does not appear to be any constant relationship between lecithin and the breakdown angle. Tests employing lard fell into the same category as the corn oil.

Undue Influence

The hydrogenated shortening employed in these tests was intentionally one of high melting point, which probably influenced the results unduly. It is purely theory, but it would seem that the more solid shortening would be more difficult to distribute evenly through the dough. This difference in dispersal rate was great enough so that the effect of the shortening could not have been complete even when the dough had passed optimum development in the mixing bowl. This is true for no-lecithin curves. However, with lecithin added to the shortening, development time, angle and tolerance values were much more uniform. This shows that lecithin did tend to increase the rate of shortening dispersion in the dough.

Forgetting that lecithin in conjunction with shortening or oil lessened development time—and looking at development - breakdown angles and tolerance figures—we might predict that the efficiency of 2 percent shortening with 0.15 percent lecithin (or 1 percent shortening with 0.3 percent lecithin) would closely approximate that of a dough containing 4 percent shortening and no lecithin, insofar as lubricating value alone is concerned.

Confirmed by Trial

To confirm this prediction, a baking test (Fig. 7) was made involving these amounts of shortening and lecithin. The loaf score with 4 percent shortening and that with 0.3 percent lecithin and 1 percent shortening were identical. With 4 percent shortening, as with 1 percent shortening and lecithin at 0.3 percent, there was some loss of volume typical of high (above 4 percent) shortening levels in bread along with a characteristic enhancement of texture, softness and crust character. The improved keeping properties obtained with normal shortening plus lecithin have been previously reported. The loaves scored off for slight volume loss and darker crust color (no adjustment was made in baking time).

One would be inclined to conclude from this result that lecithin would be desirable as a means of saving shortening. This may be so. But it is our opinion that the lecithin should be considered for its effect in improving value and efficiency of the existing shortening in the bread formula. This behavior, of course, is apart from its effect on gluten and dough handling.

Conclusions

From the results of our work, we believe that we can draw certain conclusions regarding lecithin effects and its usage. In recording-mixer curves, lecithin does not cause any change in consistency of the doughs, although the presence of lecithin does broaden the development-breakdown angle. The effect is brought about usually by an increase of tolerance to mixing. Lecithin does not neutralize extremes of strength or weakness in the true sense of the word. But in strong and weaker glutens of a bakery protein range (i.e., Southwest 12 percent and spring 12.80 percent) there was an increase in ductility of the gluten of the Southwest flour, which would be desirable. And there was a slight decrease in the ductility of the extremely elastic spring wheat gluten, also desirable inasmuch as this decrease would make this type of gluten slightly easier to develop and less easy to overdevelop into a rubbery dough. This change could be termed a mellowing effect on the gluten.

Baking tests indicated that maximum benefits from lecithin were obtained at a level of 0.25 percent. This was verified by the tabular data on the recording-mixer curves, where maximum beneficial effects could be observed at 0.25 to 0.5 percent lecithin, and at 0.25 percent to 0.3 percent level when a flour carrier was used.

The proper method of incorporating lecithin into a dough apparently is a matter of personal preference or ease of handling. We found that lecithin in commercial form did not score quite as well as when a carrier was used. However, incorporation of such a small amount is difficult at best, and for more complete dispersion some carrier should be employed. Water, flour or oil seem best

(*Turn to page* 228)

CREAM PUFF TROUBLES Are Overcome by Test Studies

Here is an example of how Armour helps users of ingredient materials improve quality of finished products. Formulas are developed in which experience of the artisan is correlated with scientific findings

By F. G. WHEELER, Supervisor of Research Bakery,
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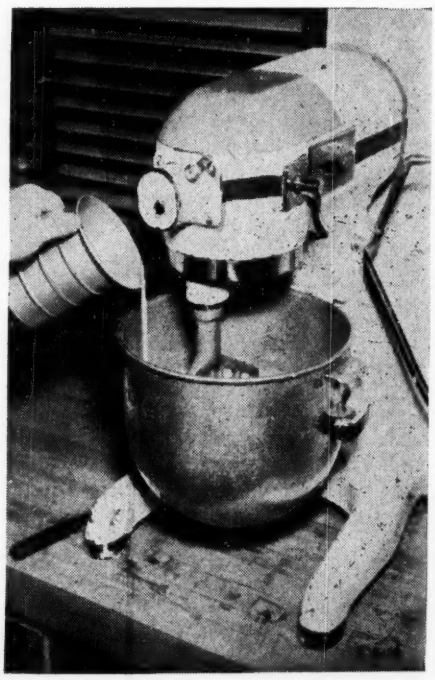
IN successful food manufacture and processing, both the artisan and the technologist are as essential and as complementary in their functions as are ingredient materials and processing equipment.

Perhaps no better example of this relationship can be found than in the making of cream puffs. The technologist may have done his part in setting up the specifications covering the selection and purchase of raw materials, the choice and installation of bakeshop equipment, and the working out and adoption of formulas. However, without the services of an experienced artisan, there would be no production of marketable cream puffs.

Cream puffs are the most unpredictable of baked goods to make. They are both the bane and boon of the baker—the artisan. They have long been accepted as the "hallmark" of the master baker. The ability to make good cream puffs has landed a promising job for many a prospective "first hand," and many a poor or mediocre baker has been able to hold a "top" job long after his other deficiencies have been discovered, because of his ability to make these delicacies.

The technologist may have done his work well, and the formula book may contain explicit information on the making of cream puffs. Yet, in spite of the closest adherence to directions and the use of specified materials and equipment, many bakers find that the results of their efforts are not as good as they should be. Their puffs turn out to be highly irregular in quality.

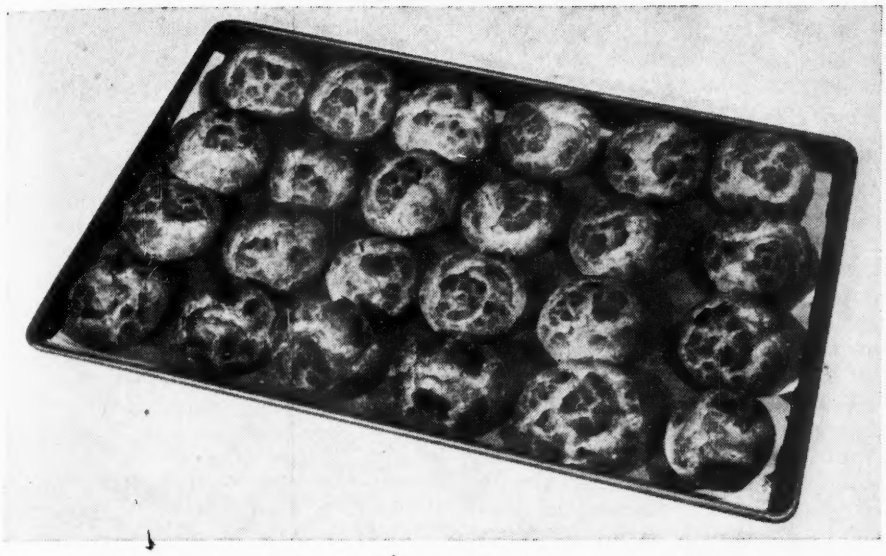


Although the quantity and quality of eggs used have a significant influence upon the appearance and quality of finished cream puffs, the temperature at which, and the manner in which, they are added to the mix are equally important factors.

"Why?" the baker asks and tries again with even more meticulous attention to the details given in the formula book. When he gets a second and a third batch of irregular puffs, the baker concludes that the author of the formula book is incompetent, that he is working inferior ingredients, or even that the much maligned shop-help is to blame.

The fault, however, lies not in omissions in the formulas, nor in the quality of the ingredients, nor in the

Proof of correct procedure in making cream puffs is the symmetry, general appearance and character of the puffs as taken from the oven.



Use of hard-surfaced paper liner in the pan uniformly gives the desired well-rounded and symmetrical puffs without loss of bottom because of sticking.

inefficiency of the bake-shop help. It lies, chiefly, not in the instructions themselves as given, but in the lack of precise instructions. The detailed instructions needed are those which only an experienced artisan can supply—details obtained only through experience, yet expressed by a technologist in manner that makes them understandable and capable of being followed by a less experienced artisan.

To the end that this gap between the technologist and the average artisan may be bridged with respect to cream puffs, the Armour and Company Research Bakery staff has completed a detailed study of cream-puff making and makes available the following information.

By definition a cream puff is "a round shell of chou paste filled with whipped cream or a cream filling." *Chou* (pronounced "shoo") is the French word for cabbage. The French and English use the term "cream choux" ("choux" is plural for "chou," and has the same pronunciation). Eclair also is French, and pastries of that name are common in France, England, and the United States.

As a matter of differentiation, cream puffs, as such, are round in shape, are filled with whipped cream or cream filling, and are usually dusted with powdered sugar before being sold. Eclairs, on the other hand, are finger shaped, are generally filled with cream filling and are frequently coated with chocolate or chocolate icing. Chou or cream-puff paste is an emulsion consisting of water, shortening, salt, flour and eggs.

In making the emulsion, heat is used to melt the shortening and to boil the water preparatory to stirring in the flour to form a partial emulsion. After slight cooling, the paste is further emulsified by continued stirring during the gradual addition of the eggs.

Functions of Ingredients

In composition, cream puff paste must contain water, shortening, salt, flour and eggs. Milk and chemical leavening agents are frequently used. In determining the function of each ingredient in the course of the cream puff studies, experimental tests were made covering a wide range of variations for each ingredient. The range of variations with recommended optimum quantities are given in Table I. The functions of each ingredient are as follows:

Water—Water is used to gelatinize the flour and to control the thickness of the shell wall. If the quantity of water used in the first stage of the procedure is reduced, the thickness of the shell wall will be increased, providing all other procedures are correct. Reduction in the quantity of water will also facilitate the drying out of the shells. If the water is increased, the shell wall becomes thinner and tougher. An extremely large amount of water will cause difficulty in drying out the shells.

Shortening—Shortening is used for its lubricating power and for its contribution to emulsion formation. A decrease in the quantity of shortening makes the puffs less tender and less symmetrical. An increase in shortening improves both tenderness and symmetry. But when an excessive quantity is used, the puffs flatten during baking and the shell is prevented from hollowing-out satisfactorily.

Flour—Flour is a structure builder and in that role helps the shell to hold its shape. Flour also contributes to the formation of the emulsion. The quantity can be varied greatly without disastrous results. Reducing the quantity in a given formula causes the finished shell to become more tender and quite thin. It does not influence the volume. When the quantity of flour is increased, the shells become tougher, and too great an increase also may have a detrimental effect on the symmetry.

Eggs—Eggs are used in cream puffs because of their ability to expand during baking. Also, they coagulate to help the shell structure. Eggs supply a major portion of the liquid in the cream-puff paste; therefore, when the quantity of egg is varied, adjustments must be made with the other liquids, such as milk or water, to give the paste its proper consistency. Decreasing the quantity of egg causes a reduction in the volume of the shells and increases the tendency toward sogginess, but does improve symmetry.

Improvement in symmetry seems to be a function of the liquid added to replace the eggs. The best puffs were obtained by using enough eggs to bring the paste slightly short of the desired consistency and by adding a small quantity of milk to complete the moistening.

Milk—The addition of milk in the last stage of manufacture reduces the cost of saving eggs. It also improves the color of the baked shell. Increasing the amount of milk added to the paste makes the shells thinner and more difficult to dry out, and increases their toughness, but tends to improve their symmetry.

Chemical Leavening Agents—Ammonium carbonate, ammonium bicarbonate and baking powder are the usual leavening agents used in cream puffs. Although good shells can be made without the use of a chemical leavening agent, a small quantity will improve the volume of the shells, especially when the quantity of egg has been reduced. Care should be taken not to use too much of the leavening agent because overuse results in a lack of volume and the shells are poorer in quality than if no leavening had been used. This effect is obtained regardless of the type of leavening used. Excessive use of the ammonia leaveners causes a noticeable greenish discoloration in the interior of the shell.

Procedures

The puff paste studies of the Research Bakery staff led us to conclude that the most important part of the manufacturing procedure is the cooking of the paste. If the water and shortening are not actively boiling when the flour is added, the puffs will not be uniform. The best procedure was found to be as follows:

Melt the shortening, then on full flame heat the water and shortening *until rapid stirring will not stop the boil.* Then add the flour and stir until the mixture is homogeneous. *Be sure that the water and fat are actively boiling before the flour is added.*

In making a larger than usual batch of puffs, best results are obtained by reducing the amount of water boiled with the shortening. Reduction is necessary because the quantity of water lost by evaporation remains approximately the same, regardless of the size of the batch, if the same kettle is used for cooking both the large and small batches. In our tests, 8 oz. of water was used to a pint mix. When we doubled the size of the batch, 12 oz. of water produced the same result as the 8 oz. used in the small batch.

Egg should be added gradually, one or two at a time, and slowly enough to allow the mixture to take up the previous addition and to leave the sides of the bowl.

TABLE I—Variations and Optimum Quantities of Ingredients Used in Making Cream-puff Shells.

Ingredient	Quantity variations used From	To	Optimum quantity
Water	4	16.0 oz.	8 to 10 oz.
Shortening ..	2	16.0 oz.	8 to 10 oz.
Flour	2	16.0 oz.	8 oz.
Eggs*	10	16.0 oz.	16 oz.
Milk	12	4.0 oz.	2 to 3 oz.
Ammonia** .. or Baking Powder	0	6.6 grams 14.0 grams	1⅛ grams 3½ grams

* Because eggs supply liquid to the paste, an increase in milk content is necessary when egg content is reduced.
** Either ammonium carbonate or ammonium bicarbonate.

In the early part of these studies we noted that the shells were better shaped when they stuck to the pan than when they were loose. This difference in sticking quality produced differences in uniformity in the shells on the same pan. After making numerous batches, we found that the use of paper liners on the baking pans improved the uniformity of the puffs. Regular wrapping paper or pan liners were excellent for this purpose, but newsprint paper was not satisfactory.

Best results were obtained when the eggs were added to the paste at 70 to 75 deg. F. The finished cream-puff paste should be approximately 100 deg. F. An oven temperature of 400 to 425 deg. F. is most desirable for baking the shells.

Based on the results obtained, the following formula is suggested:

Improved Formula

Melt shortening, then heat on full flame *until rapid stirring will not stop the boil:*

Water ..... 8 oz.
Shortening .....10 oz.
Salt .....¼ oz.

Add, stir rapidly until thoroughly and evenly mixed:

Bread flour ..... 8 oz.

Turn off heat; place in mixing bowl and mix at medium speed for 30 to 45 seconds to aid in cooling to approximately 170 deg. F. Add gradually, 1½ to 3 oz. at a time, to make a total of 1 lb., egg at 70 to 75 deg. F.

After each addition of egg, the mixture should be stirred until the eggs have been taken up and sufficient body developed for the paste to clean the side of the bowl.

Mix together; add, and stir in:
Ammonium carbonate.....1/16 oz.
Milk ..... 1 oz.

If necessary, add 2 or 3 additional ounces of milk to make a paste which is glossy and yet has enough body to hold its shape when deposited on a paper-lined pan. The temperature of the paste should be approximately 100 deg. F. Bake at 425 deg. F.

Trouble-shooting Chart

The following trouble-shooting chart can be made by tabulating the information obtained in the course of the studies on cream-puff making. If the puffs do not spring in oven, at least one of the following conditions exists:

1. Emulsion was not properly formed because:
   a. Flour was over-cooked.
   b. Eggs were too cold.
   c. Too few eggs were used.
   d. Poor quality eggs were used.
2. Oven was too cold.
3. Paste was too cool.
4. Too much leavening was used.

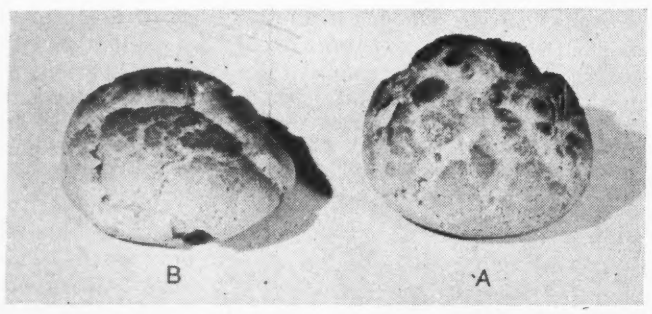
If puffs are not uniform in shape, at least one of the following conditions exist:

1. Flour was under-cooked.
2. Puffs do not stick to pans.
3. Too much flour was used.
4. Too little shortening was used.
5. Too little water was used.

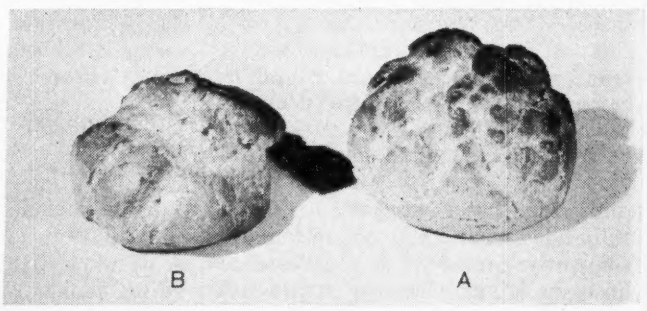
If puffs do not hollow out, at least one of the following conditions exist:

1. Emulsion was not properly formed because:
   a. Flour was over-cooked.
   b. Too few eggs were used.
   c. Eggs were too cold.
   d. Poor quality eggs were used.
2. Too little water was used.
3. Too much shortening was used.
4. Too much leavening was used.

Similar studies on other bakery foods are under way in Armour and Company's Research Bakery under the conviction that a closer correlation of information obtained from the technologist and from the experienced artisan or technician will result in finished products of improved quality and uniformity. Also, there is the possibility of an increased production return on ingredient materials and equipment used resulting in a decrease in production costs.



Comparison of puffs made by the recommended formula and improved method without paper liner in pan. (B) Stuck to pan and lost bottom, is flattened and undesirable in appearance. (A) Did not stick.



Close-up showing marked differences between cream puff (A) made by the recommended formula and improved method, including paper liner in pan and that (B) made by the usual formula and method.

Control of Microbiological Food Spoilage By Fumigation With Epoxides

By RITA WHELTON, H. J. PHAFF and E. M. MRAK, Division of Food Technology, University of California, and C. D. FISHER, Dried Fruit Association of California, Berkeley, Calif.*

PART I—Epoxides, organic compounds with an oxygen atom linked to two connecting carbon atoms in the same chain, are powerful reagents against certain yeasts, molds and bacteria that attack foods. Tests were made on dried fruits, but possibilities are not limited to them

MICROBIOLOGICAL spoilage of dried fruits may result from the growth of yeasts, molds and certain types of bacteria on the product. Fermentation caused by yeast, or molding, occurs most frequently on unsulphured fruits (prunes, figs, dates and natural raisins) during sun drying or when moisture levels are high in the finished dried product. The moisture level at which growth of microorganisms can occur depends on the kind of fruit and also on the sugar content of the particular lot. Raisins seldom undergo this type of spoilage because of their relatively high sugar and low water content. Cut fruits, such as peaches and apricots, do not ordinarily offer this problem, since they contain sulphur dioxide as a preservative. However, when sun drying is slow, due to unfavorable weather conditions, a large part of the added SO_2 is lost during drying, and these fruits may ferment and mold in the dry yard.

The moisture content of any dried fruit can be brought to a level low enough so that fermentation and molding cannot take place, and such a level may be reached naturally in storage. The humidity is so low in the important dried-fruit producing districts of California that the equilibrium moisture content of unpacked dried fruits generally lies between 8 and 15 percent. Although some of the organisms on such fruit remain viable, a moisture content below 20 percent may be considered sufficient to minimize microbiological spoilage during warehouse storage.

Before final packaging, however, most fruit is processed. This treatment removes dry-yard dirt and other contamination. It also raises the moisture content, making the fruit more easily edible and giving it a more attractive appearance and texture.

Prunes and figs are processed in boiling water to kill any yeasts and molds which are present. When treated fruit is packed hot, additional heat sterilization takes place in the stacked boxes, as it remains at a high temperature for a long time. However, if the fruit is packed cold, or if the packages are not sufficiently airtight, recontamination may occur during handling. And if the moisture content is sufficiently high, molding or fermentation is almost sure to follow. Figs are particularly susceptible to molding.

Dates, other than the Deglet Noor variety, are sometimes subjected to a heat treatment[1] sufficient to kill microorganisms, but pasteurization results in caramelization and the occurrence of unnatural odors and flavors. It would be of great value to accomplish killing of microorganisms in dried fruits and other foods without heat treatment.

The experiments reported here were designed to test the sterilizing efficiency of certain compounds, known to have germicidal properties, as fumigants on the packaging line or in fumigation chambers. It seemed desirable to use compounds or mixtures of compounds able to kill microorganisms and insects simultaneously.

Of the fumigants tested, the most successful was ethylene oxide, used either alone or mixed with some substance to lower its vapor pressure.

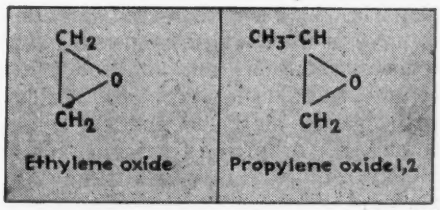


Fig. 1. The two fumigants have the characteristic epoxide structure.

Ethylene Oxide

Because of its great reactivity, and its usefulness as a precursor of many organic compounds, ethylene oxide is widely used for chemical syntheses. This compound, see structural formula in Fig. 1, is a gas at ordinary temperatures.† It has a somewhat sweet odor and is miscible with water and alcohol in all proportions. In aqueous solutions, it is hydrolysed to ethylene glycol, $CH_2OH{\cdot}CH_2OH$, a reaction which is catalysed by hydrogen ions. Apart from hydrolysis, one of its principal reactions involves a direct combination with many compounds, particularly in acid solutions, e.g.,

$$CH_2CH_2O + HCl \rightarrow CH_2OH{\cdot}CH_2Cl.$$

It will react with numerous substances present in protoplasm, and thus the nature of its toxic effect is difficult to evaluate. Lubatti[15] describes a simple method of analysis for ethylene oxide based on its ab-

*A report on a joint research project of the Quartermaster General's Office, U. S. Army, and the University of California. This is in continuation of work initiated at the University of California in 1938.

†Ethylene Oxide has a boiling point of 10.7 deg. C. (51 deg. F.) sp. gr. 0.887 at 7 deg./4 deg. C. Mol. wt. 44.03.

TABLE I—Effect of Fumigants on Growth of Yeasts and Molds.

This table indicates the amount of growth on freshly inoculated slants following exposure for the time indicated to each fumigant in a concentration of 1 ml. per liter. No growth occurred in any case during the period of exposure.

Fumigant Fumigation period:	*Oxyfume** 18 hr.	*Isopropyl formate* 40 hr.	*Ethyl formate* 40 hr.
Molds:			
Hormodendron sp.	—	±	—
Fusarium lateritium	—	—	—
Trichoderma lignorum	—	++	+
Alternaria sp.	—	±	—
Oöspora sp.	—	+++	+++
Neurospora sitophila A	—	++	—
Aspergillus niger	—	++	++
Penicillium chrysogenum	—	++	±
Yeasts:			
Endomycopsis lindneri	—	+	+
Schizosaccharomyces octosporus	—	±	+
Saccharomyces cerevisiae	—	+++	+++
Zygosaccharomyces sp.	—	±	+
Zygosaccharomyces sp.	—	+	±
Torulaspora delbrückii	—	+	±
Pichia belgica	—	+++	+++
Hansenula anomola	—	+	++
Debaryomyces dekkeri	—	++	++
Schwanniomyces occidentalis	—	±	++
Saccharomycoides ludwiggi	—	+	+
Hanseniaspora melligeri	—	±	+
Candida krusei	—	+++	+++

*Oxyfume is a fumigant which consists of 20 percent ethylene oxide in ethylene dichloride.

sorption in an acid solution of $MgBr_2$ and titration of the amount of residual acid.

Ethylene oxide was first reported as an insect fumigant by Cotton and Roark in 1928.[2] Since that time, it has been used rather widely to control infestations, especially in chamber fumigation of grain and dried fruit. Numerous papers have been published about its use for this purpose and it is not possible to quote all of such work here. In concentrations of from 3 to 80 percent by volume, ethylene oxide forms an explosive mixture with air.[3] To reduce the explosiveness, the usual method of application has been to mix it with carbon dioxide, which may be in the form of dry ice, or in pressure cylinders. The use of dry ice has the additional advantage of lowering the vapor pressure of the ethylene oxide by reduction of the temperature. In general, 7 to 9 parts of carbon dioxide to 1 part of ethylene oxide is suggested as a non-explosive and suitable mixture. The carbon dioxide is reported to enhance the toxic effect by stimulating the respiration of insects, causing a more rapid intake of the gas.[4]

It has also found use in the food industry as a killing agent for microorganisms. As far as the authors are aware it was first reported for this purpose by Kirby, Atkin and Frey,[5] who successfully prevented mold growth on bread by treating the loaves with it under vacuum and at atmospheric pressure. In 1938, a patent for vacuum fumigation at 150 deg. F. with ethylene oxide was issued to Griffith and Hall.[6] Yesair and Cameron[7] review its use for sterilization of spices, and observe that its effectiveness is greater under vacuum.[7,8,9] Hall[8] and James[9] discuss the suitability of this chemical as a means of sterilization of spices. Mrak[10] indicates that sugar tolerant yeasts of the genus *Zygosaccharomyces* obtained from dates can be killed with ethylene oxide or methyl bromide. Studies by Proctor and Nickerson[11] indicate the extreme toxicity of this fumigant for fungi, and report toxic concentrations similar to those found by the authors. A recent paper by Velu, Lepigre and Bellocq[12] discusses the bactericidal action of it in the gaseous state. In general, results suggest that this chemical has far greater toxicity for microorganisms than other fumigants commonly used on foods.

Germicidal Activity

The first fumigants tested by the authors were isopropyl formate, ethyl formate and "Oxyfume." The latter is a solution of approximately 20 percent ethylene oxide in ethylene dichloride. It was developed in 1935, to reduce the vapor pressure of ethylene oxide. It has been used in the industry, like other "line fumigants," by adding it on the packaging line to foods in containers with pervious walls, through which the uncombined portion may later escape. In this mixture, the ethylene oxide is the active ingredient.

Although ethylene dichloride has some toxicity for microorganisms, it is not desirable for use on foods since it leaves a residue disagreeable in odor and taste. In later work, it was found more satisfactory to use the ethylene oxide alone or in other solvents.

For the initial germicidal tests, a representative selection of yeasts and molds was made. From 48-hour cultures of the organisms listed in Table I, transfers were made to fresh vegetable agar slants[13]. The latter were placed in large desiccators, cotton plugs having been removed, and the fumigants were added to give a final concentration of 1 ml. per liter total volume. The desiccators were sealed with plastic clay and incubated at 86 deg. F. All of the fumigants completely inhibited growth during this period.

After exposure, the slants were incubated in air to observe for growth. From Table I it is obvious that the ethylene oxide-dichloride mixture is completely effective after exposure for 18 hours, while 40 hours exposure to isopropyl or ethyl formate shows very incomplete toxic action. The ethylene dichloride in the mixture has some toxic effect of its own, but does not kill organisms in the same length of time as the minimum equivalent concentration of ethylene oxide. Furthermore, if possible, the use of chlorinated organic compounds in food should be avoided.

To demonstrate that the failure of growth after treatment with the ethylene oxide and dichloride mixture was not due to residues of toxic materials in the agar, slants which had been exposed to the fumigant were reinoculated with viable organisms. Growth was good in all cases. Furthermore, transfers made from

TABLE II—Concentration of Ethylene Oxide—Ethylene Dichloride Solution Required for Killing Yeasts and Molds

Plus marks indicate the amount of subsequent growth on freshly inoculated slants after 3 hours exposure at 86 deg. F. (30 deg. C.).

Concentration, ml. per liter	*0.1*	*0.3*	*0.7*	*1.0*
Aspergillus niger	+++	+++	+	—
Penicillium chrysogenum	+++	++	+	—
Endomycopsis lindneri	+++	+++	+	—
Zygosaccharomyces sp.	++	+	—	—
Saccharomyces cerevisiae	++	+	—	—
Hanseniaspora melligeri	++	+	—	—

TABLE III—Comparison of Fumigants.

Approximate concentrations required to kill organisms on freshly inoculated slants. Exposure 24 hours at room temperature.

Fumigant	*Organisms**	*Concentration ml./liter*
Ethylene oxide, 20%, in ethylene dichloride	Yeasts	0.2
	Molds	0.2
	Bacteria	0.2
Propylene oxide	Yeasts	0.3
	Molds	0.3
	Bacteria	0.6
Methyl bromide	Yeasts	1
	Molds	1
	Bacteria	5

* The yeasts and molds are those listed in Table II. The bacteria included species of the genera Bacillus, Escherichia and Pseudomonas.

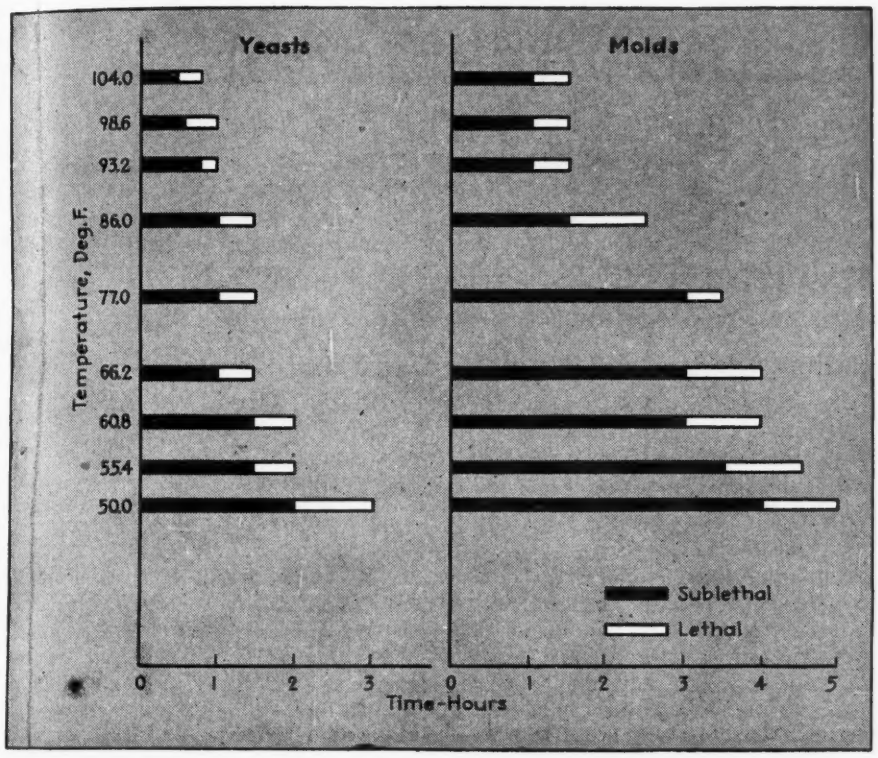


Fig. 2. Effect of temperature on the toxic action of a 20 percent ethylene oxide mixture in ethylene dichloride. Concentration was 1 ml. per liter, the effect being measured on freshly inoculated slants. Bars indicate the approximate number of hours required for complete killing of the organisms.

the slants of exposed organisms were never viable, which is additional evidence that the killing effect is not the result of inability to grow on fumigated media.

Tests were also carried out in which fully grown slants were exposed for 3 hours at 86 deg. F. to 1 ml. of the ethylene oxide—ethylene dichloride mixture per liter. Penetration of the fumigant through a thick layer of organisms is probably more difficult than killing on a freshly inoculated slant. However, no transfers made from these cultures proved to be viable.

For studies of the effect of time, temperatures and concentration on the action of this commercial fumigant, six representative organisms were selected. With exposures of 3 hours at 86 deg. F., it was found that for complete killing of all the organisms a concentration of 1 c.c. per liter of air is necessary. (Table II.)

In Fig. 2 are shown the variations in the time required for complete killing when 1 c.c. of the commercial fumigant is used. From Table II and Fig. 2, it will be seen that molds are somewhat more resistant than yeasts to the action of this fumigant, but readily killed with sufficient exposure.

Bacteria, a limited number of which have been tested, appear also to be more resistant than yeasts, and in some cases, more than molds. (See Table III.) *Bacillus subtilis*, for example, will survive 24 hours' exposure to 1 c.c. of ethylene oxide in dichloride per liter at a temperature of 73.4 deg. F., and even *Escherichia coli* is not completely killed in 4 hours under the same conditions. Further investigations of the killing of bacteria, particularly on food products, are necessary.

Similar studies with propylene oxide 1,2 have also yielded promising results. Propylene oxide 1,2 boils at 95 deg. F. Thus it is a liquid at ordinary temperatures, and more convenient to handle than ethylene oxide. See Fig. 1 for structural formula.

Although the effective toxic concentration on an equivalent molecular basis appears to be somewhat greater than that required with ethylene oxide, killing of yeasts and molds on slants can be obtained with a concentration of 0.3 c.c. per liter in 3 hours at 73.4 deg. F. (This is somewhat more concentrated than 1 c.c. per liter of a mixture which contains 20 percent ethylene oxide.)

Bacteria appear to be more resistant to propylene oxide also. *Bacillus subtilis* survives exposure to 0.6 c.c. per liter for 24 hours at 73.4 deg. F.

Propylene oxide appears to be effective in killing microorganisms on fruit, although only limited data are available thus far.

Tests of the toxicity for microorganisms of certain other insect fumigants were also made. Methyl bromide is generally regarded as one of the most effective of such compounds.[14] It seems, however, that the concentration needed for complete killing of microorganisms is far beyond the practical range. A concentration of 5 c.c. in 5 gal. is equivalent to about 27 lb. per thousand cubic feet, and even this does not give complete killing under the conditions tested. For insect fumigation, from 1 to 2½ lb. per thousand cubic feet is ordinarily employed, and higher concentrations are not desirable for use on oil-containing foods because of the increase in bromide content which may result.[14]

Experiments on the toxicity of ethylene oxide in solution indicate that a yeast suspension is killed in a matter of hours by a concentration of 0.5 percent by volume. Similar experiments on organisms in solution offer an approach to the investigation of the mode of action of the fumigants on the microorganisms.

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What Sanitation Means To the Processor

First of all, it means attention to a host of details ranging from proper location of the plant site to suitable facilities for workers. But more than that, it means higher quality, greater efficiency and satisfied employees

By RALPH E. SANBORN, Plant Coordinator Director,
California Packing Corp., San Francisco, Calif.

EXECUTIVE MANAGEMENT in the food industry has a vital interest in sanitation. Handling, preparation and processing of food demands the most scrupulous care and cleanliness. This means sanitary requirements must be taken into consideration from the selection of the cannery site to delivery of the product in its sealed container. More specifically, the successful processing of food by the canner must include:

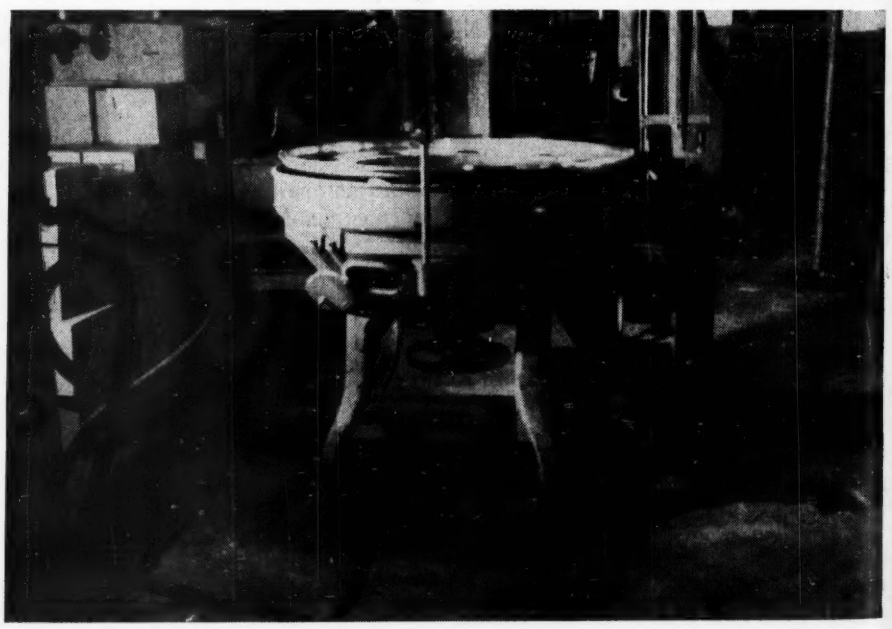
1. Careful selection of the cannery site.
2. Proper design and construction of buildings.
3. Selecting the best possible type of labor.
4. Purchasing only high quality raw materials.
5. Handling and preparing raw materials under rigid sanitary requirements.

Three Considerations

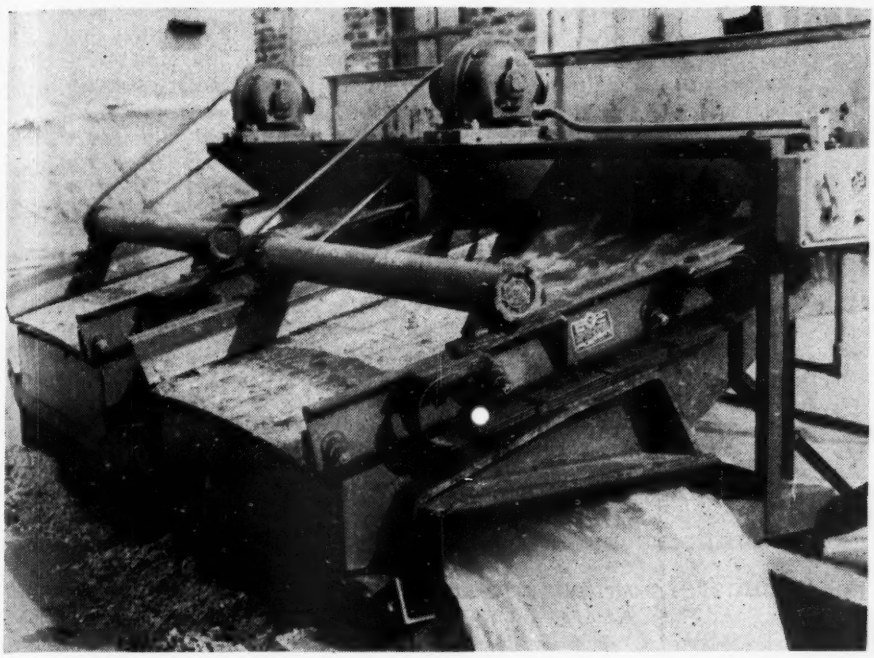
In the solution of the cannery site, three factors are involved in the problem of sanitation. One of these is the water supply. A prime necessity for cannery operation is an adequate supply of potable water. Even though the canned product is sterilized eventually, it is important that there is water available for drinking purposes in the plant. It is also important that there be no possibility of recontamination of the product by the cooling water, causing spoilage or constituting a public health hazard. Food should never be washed with water unsuitable for drinking, nor canned in sirup or brine made with such water. The water should be free from sediment, and as free as possible from scale-forming constituents, so that no objectionable suspended matter may appear in the finished product.

Another of these factors is garbage disposal. A large percentage of raw material, as delivered to a cannery, is waste. This includes corn husks, peach pits, and the like, which are rejected in the preparation of the food product and must be removed from the premises, usually by hauling. In a corn cannery, this garbage of husks and cobs constitutes approximately two-thirds of the raw material as delivered—only the remaining one-third goes into the finished canned product.

A third factor is liquid waste, or sewage, as distinguished from garbage to be hauled. This, for the most part, consists of wash water used on the product and water from plant-cleaning operations. Obviously, it will contain soluble material from the product and suspended matter consisting of soil and fragments of the product. The considerable amount of soluble food material present makes this liquid highly vulnerable to bacterial attack and decomposition, so that it usually is unsuitable for discharge as raw sewage because of the resulting stream pollution. The presence of suspended solid matter makes this liquid waste difficult to handle in city sewage plants, especially in the activated-sludge and filter-bed types. It is frequently necessary to impound it, with or without chemical treatment, relying on evaporation and percolation through the soil for its disposal. Avoidance of a public nuisance frequently presents a serious problem, the magnitude of which may be illustrated by spinach. On the average, one gallon of water for every pound



Cannery floors should be properly sloped and adequate drains provided. This asparagus filling machine straddles a drain which quickly takes away liquids spilled on the floor and water used in cleaning up.



Waste disposal is a basic element of plant sanitation. Solid material in waste complicates handling in sewage plants. Here is a dual set of vibrating screens used to remove solid material from cannery waste.

of raw product handled is run to waste from a spinach cannery. A modest operation will use 100 tons of raw spinach per day, resulting in a liquid waste of a million gallons per day or more.

The Plant Itself

The canner should carefully plan the design and construction of his factory building and the installation of the equipment, including the facilities for employees. The cannery should, as nearly as possible, provide for convenience and accessibility in the delivery of raw material and auxiliary supplies. From this point, the various steps in the preparation and canning should be oriented to minimize back haul. There should be a streamlined flow from the receiving point of the raw material to the warehouse for the finished product. Floors should be properly sloped to an adequate gutter or drain system. Placing of equipment should include consideration of the location of floor drains in relation to points of origin of wastes, accessibility for cleaning purposes, and convenience and comfort of employees involved. The placement of the equipment used for peeling, sorting and trimming—and other operations involving several individuals—should provide for convenient ingress and egress, without any hazard of crowding or accident, even in an emergency.

The plant should be p r o o f e d against rodents, and auxiliary food supplies, such as sugar and spices, should have inclosed, rodent-proof storage space. Nor should there be any places where rats can get water to drink. Also, the building should be properly screened to exclude flying insects.

Adequate lighting at all points is a must, for both the comfort and for the efficiency of the workers. Proper illumination while cleaning is highly important. Ventilation, too, must be considered, as well as avoidance of dust or smoke in the fresh-air supply. Ample dressing and rest room facilities for employees must be available, with emphasis on sanitation and cleanliness, disposal of paper towels and other such wastes. First-aid rooms, sufficiently large and as scrupulously clean and aseptic as the modern hospital, are fundamentals.

Effect on Workers

Management seeks to build its organization from the highest type of labor available in the community. Women are employed preponderantly in the preparation of food products. They are drawn preferably from families of modest income, to whom the additional earnings from seasonal cannery work are important. This selection does not extend down to the extreme of the slovenly slum-dweller type. Clean, tidy, self-respecting, ambitious housewives make the most desirable cannery workers. These women demand, or at least desire and appreciate, pleasant working conditions, as well as a sound industrial relations policy. The workers' habits are greatly influenced by the housekeeping in the plant. A housewife who takes pride in the cleanliness and order of her own kitchen will object to sloppy, wet floors, products spilled on the floor, sour or foul odors from drains or elsewhere, untidy or unsanitary toilets and rest rooms, and insects. If she is forced to work under these conditions, her own morale gradually will be lowered. This adversely affects both the efficiency and the quality of her work.

Summarizing the facts, we have postulated good, fresh raw material, entering a plant which is arranged with proper consideration for orderly and efficient production. It is airy, well-lighted, screened from insects, protected from dusty air currents. It is accessible for cleaning, has properly drained floors, and is manned by self-respecting workers who are accustomed to personal cleanliness and clean kitchen practice. Such a plant is practically certain to be operated at a high level of sanitation. Also, since this will be associated with good raw material and adequate facilities for washing the raw materials, this plant's finished products should result in clean, high-quality, desirable foods.

It's Safe, Too

Such a plant is in all probability not only sanitary, but also safe, for working conditions that serve sanitation and comfort normally present the minimum of accident and fire hazard. Conversely, rubbish piles in dark corners may breed bacteria, rats or fires, or all three. Constantly wet floors are not only unpleasant to stand or walk on but they are serious accident hazards, usually aggravated by slippery slime films produced by mirco-organisms, as filthy as they are dangerous.

So we find sanitation integrated with good working conditions, the attraction and maintenance of a high-quality labor supply, and the efficient handling of products. These connote low costs and profitable operations. Sanitation is a good investment.

Aid to Quality

Two aspects of sanitation in relation to finished products should be considered. First, food product prepared under unsanitary conditions is almost certain to contain filth, sometimes gross enough to affect flavor or appearance to the unaided eye and always manifest to the microscopist. This may consist of mold or other

microorganisms, insects or insect parts, rodent hairs or excreta—any or all of them. The United States Food, Drug and Cosmetic Act is designed to protect the consumer against such products, and the police powers of the Food and Drug Administration are directed with ever increasing vigor against unacceptable raw material and unsanitary preparation. Food manufacturers who persist in unsanitary practices may be subject to seizure of products or even the extremity of criminal prosecution.

The other aspect, to which reference has already been made, is of equally immediate and practical importance. Products cooked in the home are usually for immediate consumption and cooked primarily for palatability. They are rarely, if ever, sterile. They are highly perishable and must be consumed or refrigerated almost immediately. Canned foods, intended to remain edible after long storage at atmospheric temperatures, must be sterilized by heating to higher temperatures and for longer time intervals. They are somewhat "overcooked," compared with freshly cooked foods. To minimize this effect, commercial processes are customarily established with time-temperature factors to provide the minimum for sterilization, plus a reasonable safety margin, when employed on a clean product with a consequent low-level of bacterial infection. Bacteriology teaches that the heavier the initial infection, the more severe is the process requirement for sterilization. Infection at some insanitary point in the preparation line, therefore, may result in serious commercial spoilage or loss of quality due to more vigorous processing to overcome the heavier bacterial infestation.

The Sanitarian

Playing an important role in the problems of the food industry is the sanitarian. He is taught where to look, what to look for, and the sanitary significance of what he sees. He should possess technical knowledge qualifying him to assume leadership in a highly important and desirable movement designed to improve the esthetic tone of an industry, while at the same time promoting more efficient and economical operation in that industry.

He may encounter at the lowest level an occasional recalcitrant individual whose regeneration may eventually require the policing activities of the government. Above this moral level lies the large majority, good-intentioned, but ignorant or careless, in varying degrees. In this majority lies the greatest opportunity for education, guidance and consequent accomplishments. There is, finally, a small group whose operations are on sound scientific foundations and whose results are exemplary. But neither here nor anywhere will one ever achieve perfection.

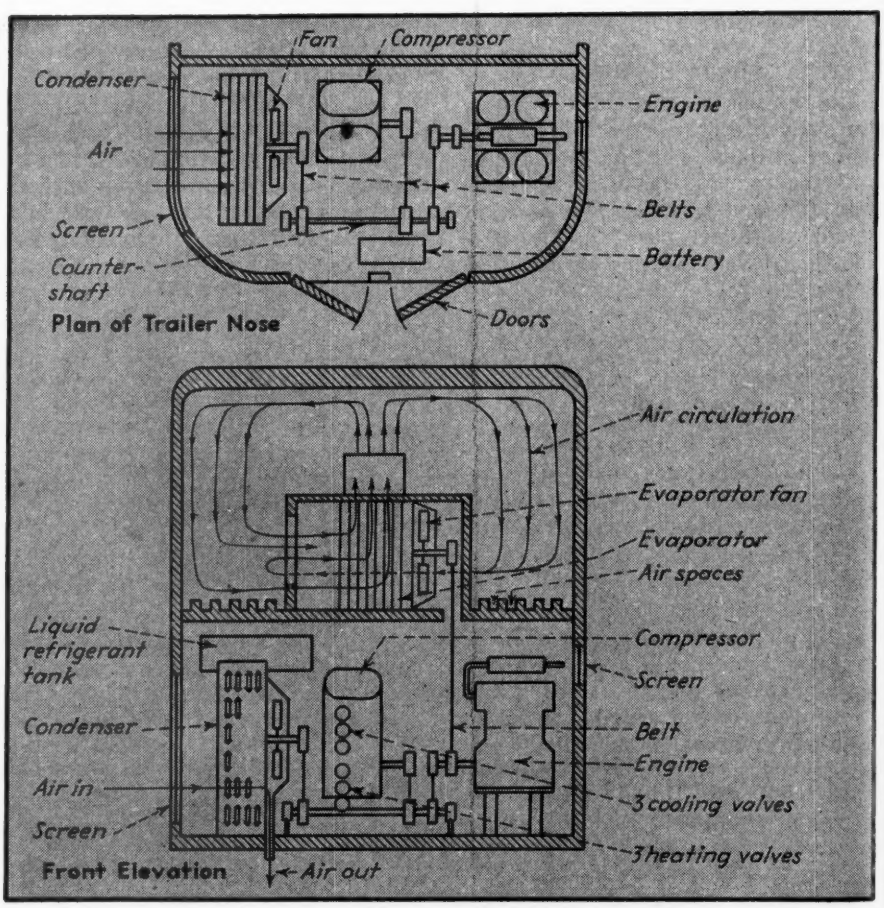
The proper scientific attitude is sustained effort to apply the knowledge at hand, while constantly seeking more accurate information.

Hot or Cold Air For Foods in Transit

Here is an air conditioning unit with reversible refrigeration. It will cool a truck load of perishables in summer, heat the load in winter to prevent freezing

REVERSIBLE refrigeration has been put to practical application in a new highway trailer air conditioning unit which cools perishables when the weather is hot, warms them when it is freezing. Equipped with this double-duty conditioner, a trailer may safely haul fruits and vegetables from the warm South to the freezing North, or carry butter in the reverse direction.

Called Trail-Aire, the equipment is self-contained and automatic in operation, except that the switch from cooling to heating, or vice versa, is manual. The unit is designed to elim-



Arrangement of the component parts of the Trail-Aire unit. A 4-cylinder, V-type gasoline engine drives the compressor and the evaporator and condenser fans.

Loading directly from a refrigerated rail car, this air conditioned trailer is equipped to maintain fresh frozen foods at the proper shipping temperature in any climate.

inate manually filled hoppers for ordinary water ice and dry ice, or tanks for ice and salt. It also does away with charcoal burners or other heating devices, such as milk cans filled with hot water, when the perishables have to be protected against freezing.

The Trail-Aire has a small 4-cylinder, V-type, gasoline engine which drives the refrigerant compressor. It also includes an evaporator, a condenser, a liquid refrigerant tank and two fans. One fan circulates the air inside the body and over the evaporator coils, while the other draws air from the atmosphere over the condenser coils. These fans are belt driven by the engine.

When the trailer air is to be cooled, the equipment works in the conventional manner. Heat from the trailer air is absorbed by the refrigerant when it vaporizes to gas in the evaporator. The gas is then compressed and passed through the condenser coils. There, heat is removed by the outside air drawn through the condenser, and the refrigerant returns to its liquid form, ready for another cycle.

How Heat Is Supplied

When the trailer air is to be heated for the protection of perishables against freezing, the refrigerant cycle is reversed. The evaporator becomes the condenser, giving off heat instead of absorbing it. The condenser becomes the evaporator, absorbing heat from the outside air, rather than being cooled by that air. This reversal is accomplished by the simple operation of two sets of three valves each.

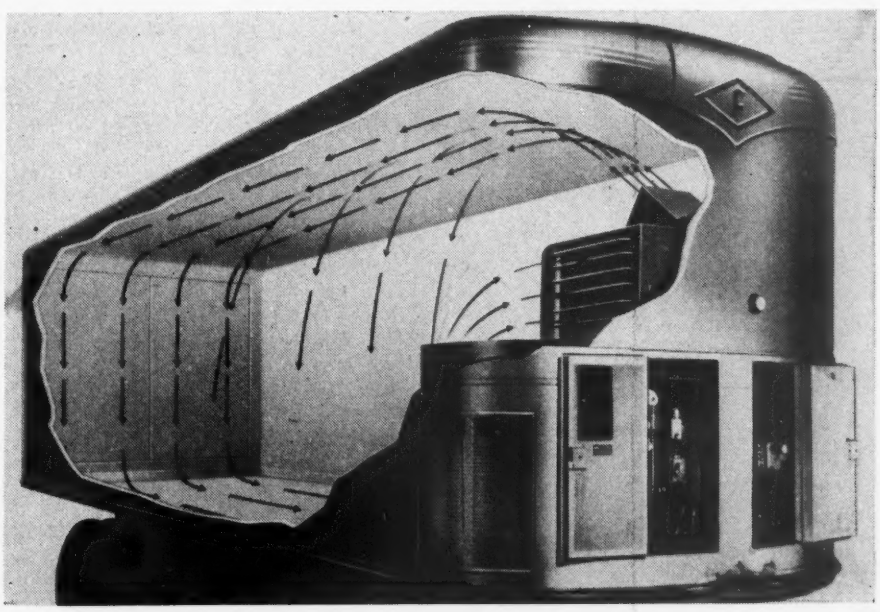
The Trail-Aire equipment is installed in the nose of the trailer through the rear trailer doors. To permit inspection and adjustment, two additional small doors are cut into the trailer nose.

The inside trailer temperature is controlled automatically by an adjustable heating-cooling thermostat, which can be reached for adjustment through the trailer nose doors. In addition, a circular dial thermometer is mounted on the outside of the trailer nose so that the temperature inside can be easily determined.

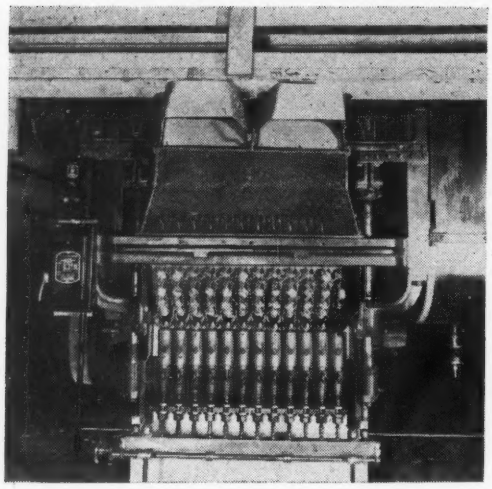
The gasoline engine which drives the unit has an automatic choke and a full-automatic starting-and-stopping pushbutton switch. A 9-gal. tank under the trailer floor supplies fuel to the engine.

A high-pressure cut-out is provided to stop the engine if, for some reason, the refrigerant pressure should rise above normal. This guards against blown head gaskets and the resulting loss of refrigerant.

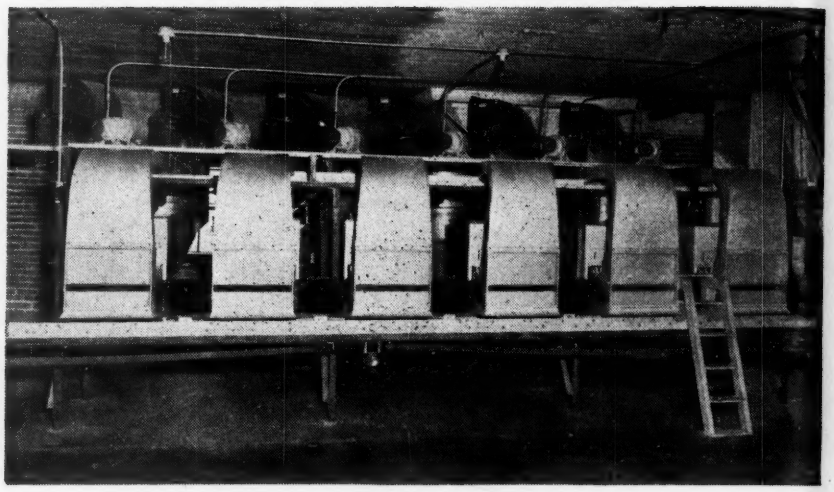
Trail-Aire is made by Advance Manufacturing Co., Detroit, and is sold exclusively by Fruehauf Trailer Co., Detroit, for installation in its insulated refrigerator vans.



A cutaway shows the 1,800-c.f.m. cycle of cooled or heated air in the new Trail-Aire unit. Entirely inclosed, the unit can be reached through the two trailer-nose doors.



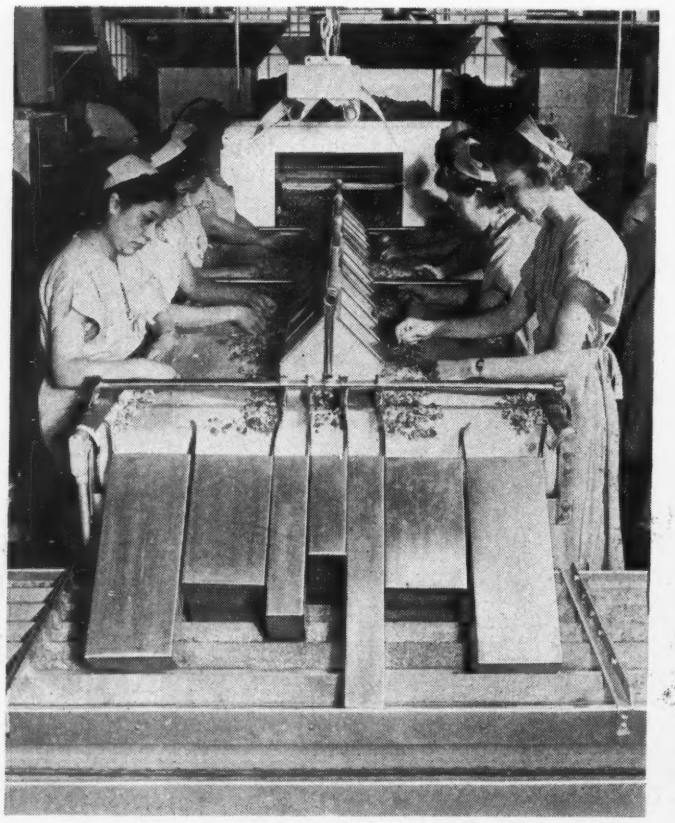
1. Jaws, operating like a belt, carry nuts beneath jaws operated by springs and hydraulic pressure to crack up to 1,200 lb. an hour.



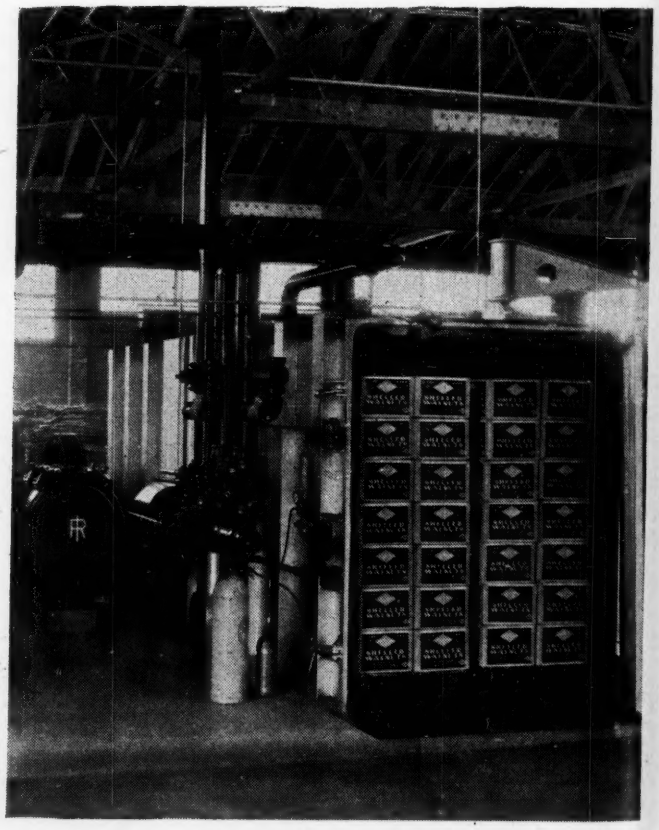
2. Shells are separated from the kernels in these vacuum machines. Because of the large surface area of the shells, the vacuum removes them yet does not pick up the kernels though they have a lower specific gravity.

Nuts Shelled by Machine

Modern plant of California Walnut Growers Association cracks walnuts on mass-production scale and efficiently separates shells from kernels. Shelled nuts and bags for growers are fumigated. Much engineering know-how involved

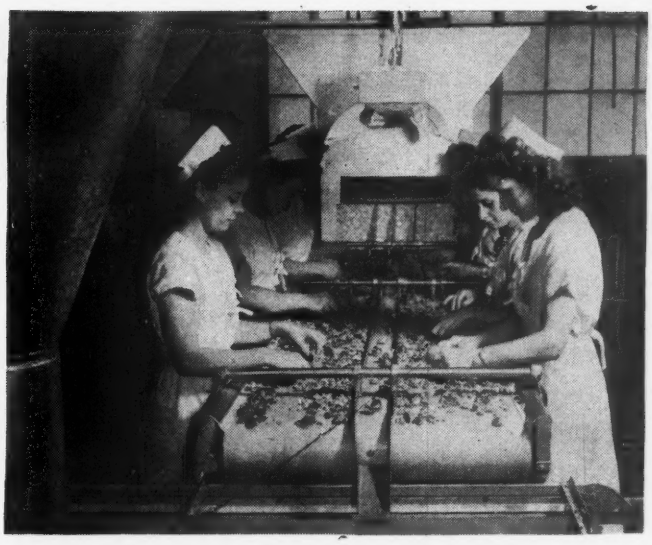


5. Here, highly trained workers make color separations which determine quality grades. Then kernels are cleaned by air under high pressure and vacuum and filled into cartons.

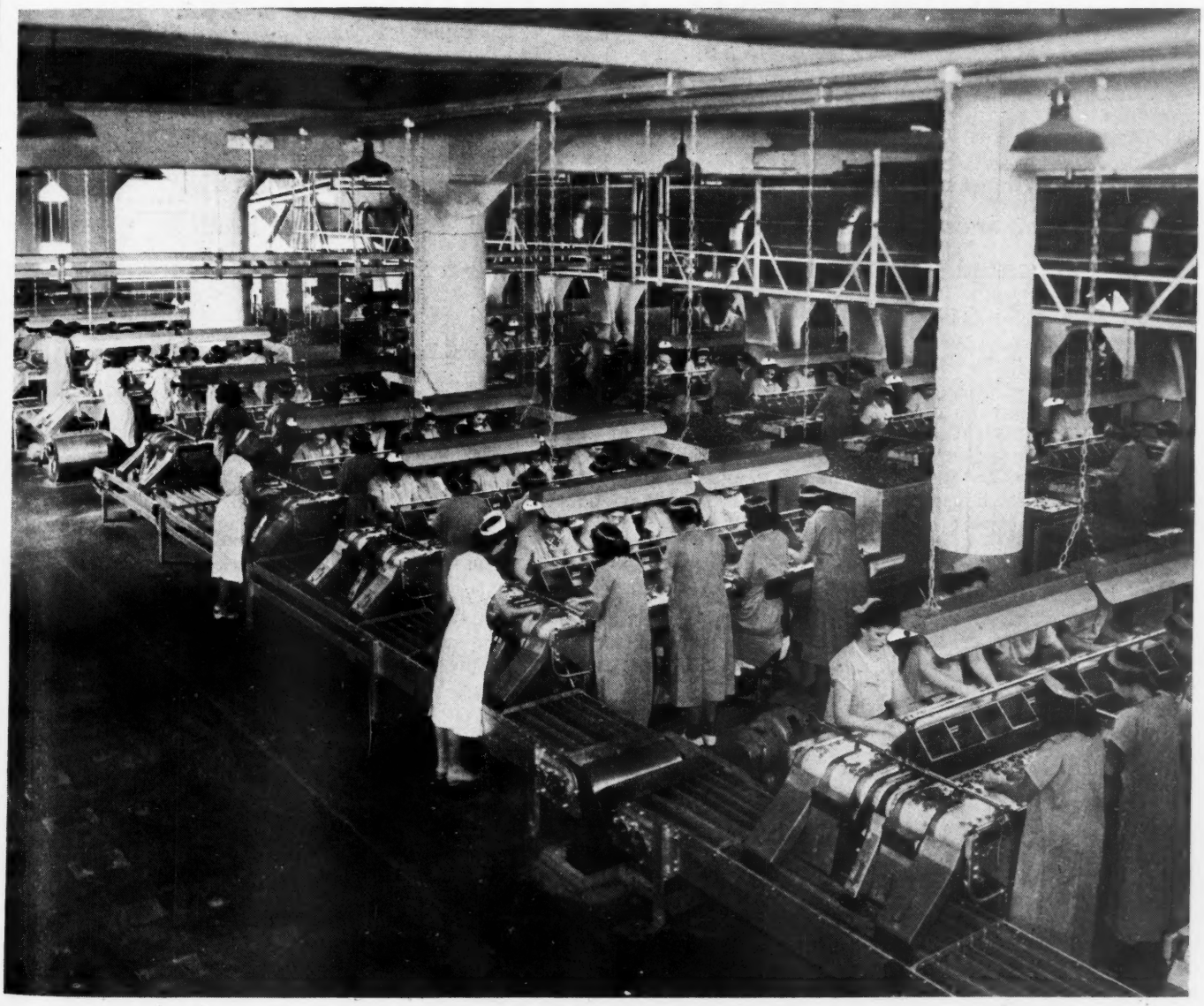


6. All shelled walnuts packed by California Walnut Growers Association are vacuum fumigated, as are all service bags sent to the grower members.

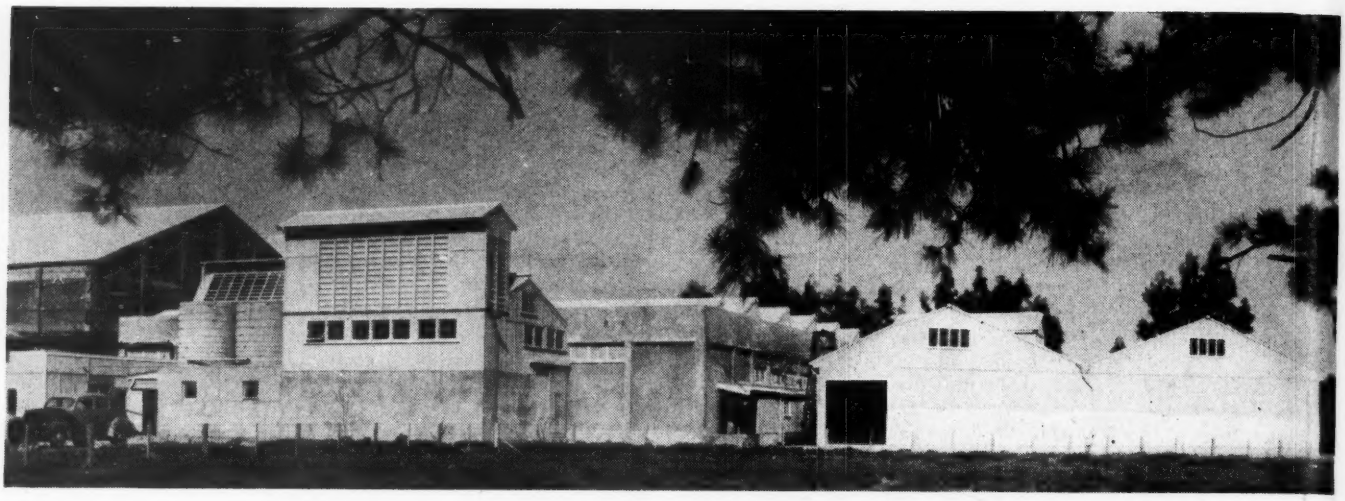
3. Trained pickers working along an endless belt free kernels from any adhering shells. The mixture of kernels and the shells is carried to a second vacuum operation, shown in picture 4.



4. Vacuum unit at rear removes shells. Graders pick out any remaining shell fragments and bad kernels. Kernels are separated into pieces and halves by a spiral grader.



7. General view of the shelling plant, showing the modern equipment and sanitary conditions.



General view of meat dehydration factory.

How Meat is Dehydrated In New Zealand

Frozen meat is supplied to central dehydrating plant. After thawing, the meat is precooked, ground and trayed. Concentrated broth is poured over it and the meat is dehydrated in a multiple-tunnel dryer

By J. C. ANDREWS, Epsom, Auckland, S.E. 3, N. Z.

IN establishing meat dehydration in New Zealand, it was not considered necessary to erect a plant near each slaughter house. Facilities for freezing meat were available at various packing plants, and it was believed practicable to transport the material in frozen form to a central dehydration plant. No information was available, however, as to the results obtained in dehydrating frozen meat. To get such information, experiments were conducted to determine whether the product would be inferior to fresh meat that had been dehydrated. This study revealed no appreciable drop in quality, as long as the frozen meat was not kept in cold storage for any great length of time.

The frozen meat is thawed by hanging it in a specially designed room supplied with warm air. Flowing into the room through a series of ducts located above the meat, the air gradually circulates downward over the frozen material and escapes from the room at floor level. To insure a ready supply of meat for factory operations, a series of thawing vats is also provided. In these vats, frozen or partially thawed meat is placed in slowly circulating 70-deg. F. water and completely thawed.

After thawing, the meat is delivered to a table where gristle and surplus fats are removed and the meat cut into approximately 5-lb. pieces. After this operation, the meat is delivered to a machine where it is sliced by rotating circular knives into slabs not more than 2 in. thick and delivered into perforated metal baskets.

Cooking Operations

The baskets, containing from 400 to 600 lb. of raw meat, are conveyed to a series of wooden cooking vats heated by closed steam coils. After processing in boiling water for about 20 minutes, the baskets of meat are immersed in soup obtained in a previous cooking. The baskets are then lifted, allowed to drain, and emptied on a large stainless steel receiving table, where further drainage and cooling occurs. Surplus soup from the cooking operation overflows into settling tanks, passes through filters and is reduced to 15 deg. Baumé in a two-stage, vacuum evaporator.

The cooked meat on the receiving table is fed into a power mincer, equipped with a cutting plate having ⅜-in. holes. As it discharges from the mincer, the meat drops onto a horizontal, revolving wheel with four spokes, which distributes it to all parts of a receiving tray. And teeth on the under side of the spokes spread the meat evenly on the tray as the wheel revolves. The tray loading is arranged so that the weight is approximately 1¾ to 2 lb. per square foot.

Now, the concentrated soup obtained from the cooking liquors is sprayed over the surface of the meat on the trays. The loaded 2x3-ft. trays are then placed in trolleys,

each of which accommodates 99 trays, and the trolleys are dispatched to the dehydrater.

Dehydrater Equipment

The dehydrater is a double, tunnel-type plant and operates on the cross-draft principle. The structure, composed of ferro-pumice concrete, internally and externally plastered, is approximately 55 ft. long, 33 ft. wide and 13 ft. high. Each tunnel is divided by a series of partitions into four sections, the internal length of each section being sufficient to accommodate two trolleys. Four trolleys fill a section, two on each side. The ends of the trolleys are solid and lined up with the gaps in the partition walls to isolate each section so that different operating conditions can be attained. Air is driven by a fan over a set of heater coils and into a plenum between the two lines of trolleys, and a static pressure of 1 to 1½ in. of water is built up. This pressure forces the air to flow in opposite direction across the trays and into two return ducts. On its way back to the fan, the air passes through two condensers in which cold water is circulated.

The equipment required in each consists of two fans, each delivering 20,000 cu. ft. of air per minute, two condensers, and one heater, the heater and condenser being of finned-coil construction. The system is totally inclosed, and the fan shafts pass through the top of the structure. Oil seals avoid air leakage.

The trolleys used are approximately 6 ft. long by 3 ft. wide by 5 ft. high, and are fabricated of galvanized iron. They run on two fixed leading wheels and a single swiveled wheel at the rear, so turntables are not needed. Each trolley is divided into three equal 2-ft. partitions, each of which is provided with guides for 33 trays. The trolleys are equipped at the base with a drop coupling for attachment to each other.

Operation and Control

In operation, the trucks are fed into the first section, two trucks on each track, and the entry door is closed. When the necessary time has elapsed in the first section, the entry doors are again opened and two more trucks moved in on each side, the lines being winched forward until the first two trucks occupy the second section. This operation is repeated until finally the two original trucks are withdrawn from the exit end of the dehydrater.

Regulation of temperature and humidity in each section of the dehydrater is achieved by automatic valve control of the quantity of water and steam passing through the condensers and heater, respectively. Wet- and dry-bulb recording controllers are used.

The actual conditions which are set for the dehydration of a quantity of meat depends largely upon the amount of fat present. Some experience is required to set the conditions so that the product leaving the dehydrater has the correct moisture content (approximately 5 percent).

The dehydrated product is discharged from the trays and lifted into overhead hoppers where, using a good grade edible beef tallow, the fat content of the product is adjusted to approximately 40 percent. It is then fed into presses and compressed into 6-lb. meat cans. These are closed, tested under pressure for air-tightness, dip-lacquered, labeled and cased.

Developing the Facilities

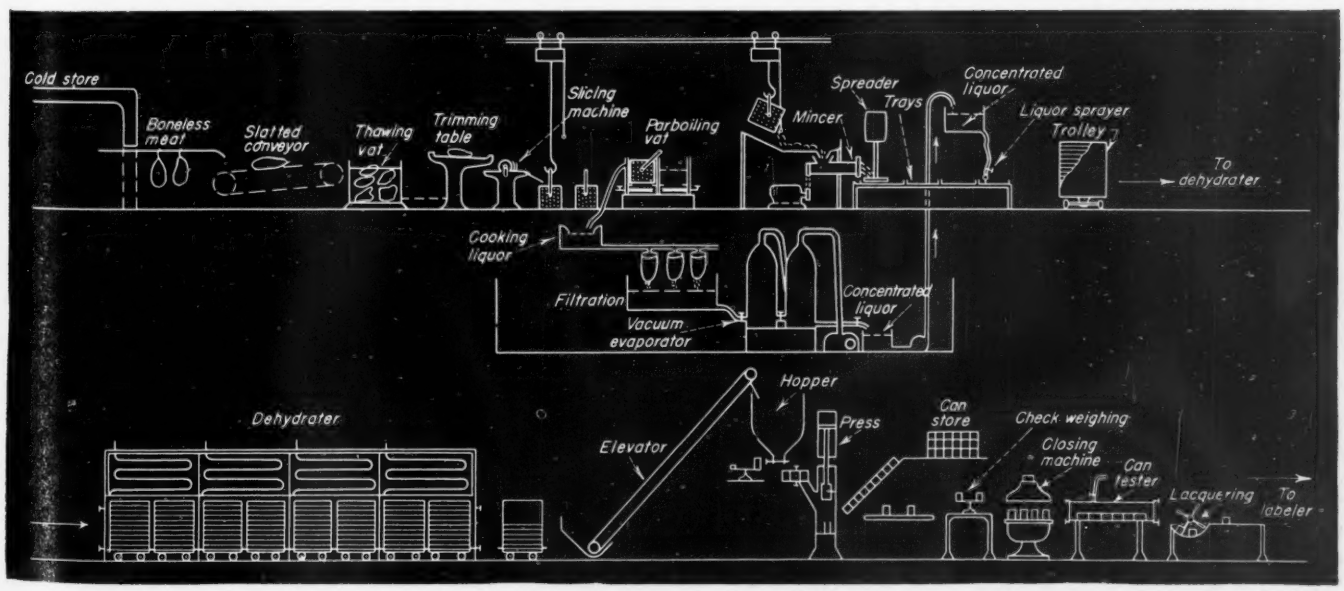
The serious consideration given to the dehydration of meat and the operations carried out were principally a result of the situation which developed during the early years of the war. The initial experimental work was carried out at the Low Temperature Research Station at Cambridge, England. The results of these investigations were made available to the dominions, and when the situation became critical this work was so far advanced that the commercial production of dehydrated meat was practicable.

New Zealand was requested, along with the other Dominion, to consider the possibility of dehydrating some of its exportable surplus. Some experimental work was carried out in small cabinet dryers so as to gain experience in the problems likely to

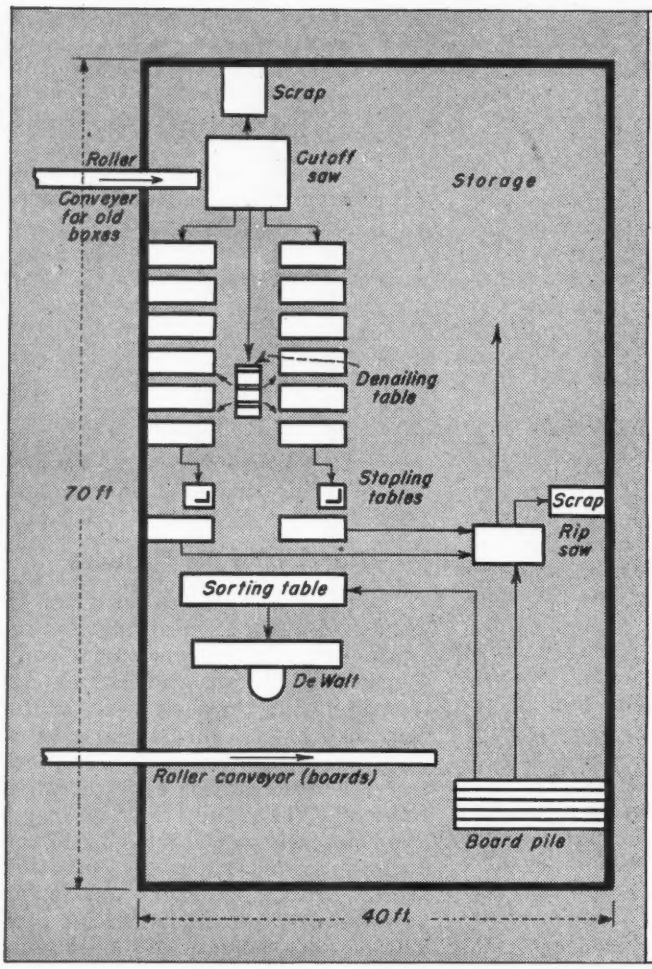
(*Turn to page* 222)

Typical Operating Conditions in the Dehydrater.

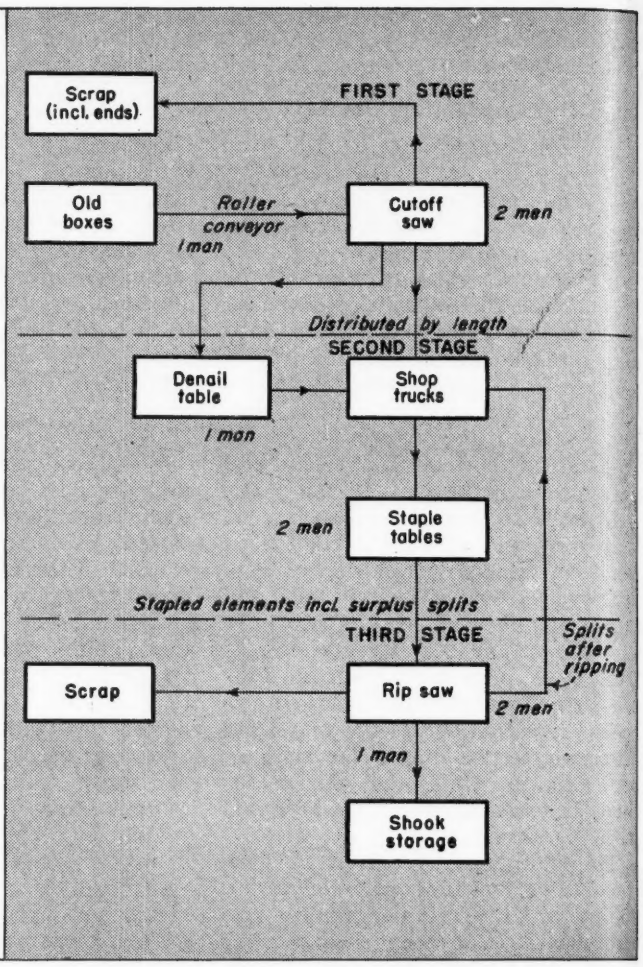
	Section I	Section II	Section III	Section IV
Dry-bulb temperature of air off heater	200° F.	180° F.	160° F.	140° F.
Dry-bulb temperature of air off meat	171° F.	162½° F.	155½° F.	139° F.
Wet-bulb temperature	146° F.	127½° F.	113° F.	97¼° F.
Temperature of water entering condenser	60° F.	60° F.	60° F.	60° F.
Temperature of water leaving condenser	130° F.	120° F.	100° F.	90° F.



Process flowsheet for dehydration of meat.



Layout of equipment for cutting up miscellaneous old boxes and making shooks for new ones of various sizes. Old boxes are taken from pile at upper left.



Flow diagram of the operations involved in making new boxes from old, showing three work stages for a three-man crew which moves from stage to stage as the work progresses.

New Boxes From Old

Here is a practical production line for cutting up old wooden boxes and making new ones from the boards on an efficient cost-saving basis. Developed to meet a wartime need, it has peacetime application

By V. A. DASH, Production Analyst, New York, N. Y.

NEW BOXES of various specified dimensions were needed in large quantities for a certain wartime packaging operation. It was difficult to get enough new boxes, but there was available a great supply of old boxes of all sizes and types of construction. So technics were developed and a simple production line set up to make the new from the old. That the operation was successful—and therefore of interest to manufacturers who use wooden boxes—is proved by the 45-cent average cost of a rebuilt box, compared with a price of $1.35 for a new container. The 45-cent figure is based on 80-cents-an-hour labor, no charge for the old boxes and no rent. It includes power, maintenance and other costs.

Boards with which to make the boxes are obtained by sawing the ends off old boxes on a cut-off saw. Each box is cut off as near one end as the nails will permit. Then it is sawed at the other end at a point which gives the length of boards required. The loose boards obtained in this way are placed on shop trucks and moved to stapling tables. Here

a board is placed in an L-shaped plywood jig. One arm of this jig is the exact length of the board required. On the other arm is marked the width of the piece desired. If one board is not wide enough, a second or third is placed alongside until the last one overlaps the width mark, and these are then stapled together to form a new-box element. Since it is to be trimmed, the last board may have a split or bad edge.

Elements of the same width are stacked separately on a truck and taken to a ripsaw to be cut to exact width. Surplus boards with bad edges are placed on one end of the truck, and at the ripsaw the bad edges are cut off and the pieces returned to the stapling table.

After the stapled elements are ripped to exact width, they are trucked to appropriate piles in the storage area, ready for assembly into new boxes. A simple guide to the piles is one of each element nailed to the floor, so that elements of this size may be stacked upon it. A sander behind the ripsaw will produce new-appearing boxes at slight cost.

The key to the success of this operation is the fact that the workers need have no knowledge of what piece goes into what box. Every operation is accomplished by fitting a piece to a mark.

Special Tools Speed Work

As indicated by the flow diagram, several auxiliary steps are involved in this operation of making new-box elements from old boxes. To go back to the beginning, the old boxes are brought to the cut-off saw on a roller conveyor. At this point, some of the boxes will be too large to handle on the cut-off saw. These must be dismantled and the usable pieces thrown into the boxes on the conveyor. For the dismantling operation, a special tool was devised. It consists of a 2-ft. pinch bar with the gooseneck removed and a 4x6-in. five-sided plate welded to the heel of the prying foot. A fairly sharp chisel edge is ground on the ends and slanting edges of the foot for insertion into the cracks after they are started. The foot gives sufficient lift to fully remove the nails from their seats.

For dismantling, a box is set on its bottom and the tool rammed into one corner and along the end. When the bottom is loosened from one end, the tool is pulled back along the sides, using the sides of the plate. The final operation is to lift the other end from the bottom. Similarly, the ends are lifted from the sides.

After the boxes and the dismantled boards have been cut to length on the cut-off saw, the pieces needing separation and denailing (such as side and bottom pieces that are nailed together) are placed on a truck at the denailing table. The ends of the boxes are thrown into a scrap pile.

The denailing table is equipped with another specially developed tool. It is a separator mounted on a post of the table, and is really a simple, heavy modification of the old-fashioned mud scraper. By placing the side board of the old box bottom at a slight angle on the separator and pushing strongly, the separator is forced into the crack, and downward pressure starts the separation. The material is then shifted so that a corner of the separator is between, or next to, stubborn nails. After denailing, the pieces are distributed to appropriate trucks, according to their length. Split edges are of no concern as long as not less than half of the pieces on any truck have two good edges. When the proportion gets out of balance, it can be adjusted in subsequent operations.

Still another special device is the jig arrangement on the stapling tables. As mentioned, an L-shaped piece of plywood is used for assembling the boards that are to be stapled, a separate jig being used for each board length. This jig is fitted into an L-shaped holder along the right side and back of the table, the holder being securely fastened to the plank table top so as to withstand some pressure and vibration.

Keeping Rip Saw Busy

Because the ripsaw is not fully occupied in trimming stapled box elements to width, it is kept busy cutting miscellaneous boards. In slack periods, these boards are ripped to widths which avoid nails and are stacked beside the saw. In other slack times, such boards are sent to a de Walt saw (movable saw suspended above table) to be cut into cleats or, if wide enough, into other lengths. The cleats go directly to stock and the lengths to the trucks. To facilitate handling, the de Walt saw was placed at the opposite end of the truck line from the cut-off saw (see diagram).

Basic equipment for this operation, then, includes two table saws (cut-off and rip), several lengths of roller conveyor, 20 shop trucks, a home-made denailing table and two stapling tables, together with the specially built dismantling bar and separator. (The de Walt saw is extra equipment.)

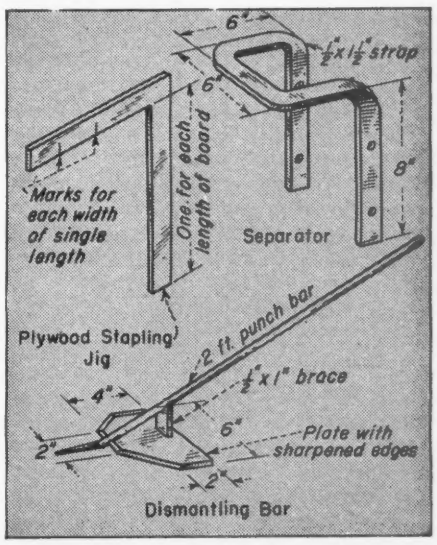
Workers Required

Personnel needed varies from 3 to 13, depending upon the output required. A labor force of 13 has produced 200 sets of box shooks a day. If only 3 men are employed, they would do the job in three steps as follows:

1. One would work on the old-box conveyor and two on the cut-off saw.
2. One on the denailing table and two on the stapling table.
3. Two on the ripsaw and one on shook storage.

Men are needed for loading old boxes onto the roller conveyor, for de-ending the old boxes and for denailing. Women can perform all of the other operations.

To turn out the complete boxes, a crew of nailers would be required in addition.



Three special, but easy to make, tools which simplify the operation. A box dismantling bar is made from a 2-ft. pinch bar with the goose-neck removed and a 4x6-in. five-sided beveled plate welded to the prying foot. A separator for taking nailed-together boards apart is made of steel strap. An L-shaped piece of plywood serves as a jig for assembling boards of proper length and width for stapling together.

A Wartime Idea

The method and equipment described in this article were developed during the war to efficiently provide a greater supply of wooden boxes for the shipment of material from one of the ordnance plants. Although the layout and special tools were developed for a particular purpose that was outside of the food field, they have potential application in peacetime industries. The idea has potential application in food processing plants where large quantities of wooden boxes are employed, such as dairy and fish canning operations.—The Editors.

OIL OF ANGELICA— Production and Characteristics

Grown in Europe, Canada and the United States, the angelica plant is a source of flavoring material for the food industries. Physical and chemical characteristics of the essential oil are given in detail

By ERNEST GUENTHER
Chief Chemist, Fritzsche Brothers, Inc., New York, N. Y.

FLAVOR and perfume manufacturers employ mainly the angelica root and seed, or the respective volatile oils which can be obtained by steam distillation. Recently the flavor industry has shown a preference for the essential oil because it can be dosed more accurately. Confectioners use the fresh stems and leaf stalks of angelica as a garnish.

Archangelica officinalis Hoffm. possesses a long, thick, fleshy, biennial root with many rootlets attached. Annually, it develops a hollow, round, jointed, channeled, smooth, purplish stem which is divided into numerous branches and grows 5 ft. or more high. Greenish-white flowers are borne in compound umbels. The whole plant is aromatic.

The rhizomes are short and thick, 5 to 10 cm. long, and sometimes split. The numerous roots, frequently twisted or braided, possess a gray-brown, reddish or purplish-brown color. They have a strong aromatic odor and a warm, pungent, bitter-sweet taste. The seeds are oblong, round at the ends, and of whitish color.

Archangelica officinalis Hoffm. (*Angelica archangelica* L.) is a biennial plant, native to Europe, grown there and in the United States as garden angelica. In the eastern United States, one finds also a native wild growing species, *Angelica atropurpurea*, our common masterwort. This root, however, has little commercial significance, being quite different in odor and flavor from true angelica.

Garden angelica thrives best on rich, alluvial soil and in a temperate, rather cool climate. Wet cold over a continued period of time is not conducive to good growth. Europe's main angelica producing regions, where the bulk of root and seed originates, are located in Belgium, France (Clermont-Ferrand and Puy-de-Dome) and Germany (Thuringia). In Belgium and France, angelica is cultivated for its root and seed, in Germany it is grown primarily for root.

Belgian Angelica Oil

Angelica is planted in September and October, before the winter cold sets in. The following June and July, the stalks (which resemble common rhubarb) are harvested mainly for employment in fruit preserves.

When cutting the plants, care must be taken to leave the principal central stalks, which will grow the following year, branch out and produce the seeds. These plants reach a height of 6 to 7 ft. When the seed ripens in July, the umbels (seed clusters) are cut, gathered by the workers in their aprons and emptied into sacks standing along the edges of the fields. The collecting is repeated several times, at intervals of a few days, as the seed ripens. The umbels are subsequently dried with warm air, either by hanging in garrets or in kilns. The dried umbels are lightly beaten, the seed sifted and winnowed.

No time must be lost in clearing the field for a new crop. The plants are pulled out immediately and the roots collected. If they are allowed to remain in the ground, the roots will quickly rot.

The total production of angelica seed in Belgium varies from 40 to 50 tons; that of roots averages from 15 to 20 tons.

Distillation of Root Oil

As pointed out by the author,[1] it is a rather surprising fact that no distillery of aromatic plants exists in Belgium's growing regions, all the plant material being exported and processed in the essential oil factories of Southern France (Crasse), England, Germany and the United States. Before shipping, the root must be dried thoroughly. When ordering roots for distillation purposes, material free from the lower woody stalk parts (which contain very little essential oil) should be specified. It seems that the slender rootlets are particularly rich in oil. Upon prolonged aging, the roots lose part of their essential oil, the yield decreasing as the more volatile terpenes gradually evaporate. Fresher roots yield oils of lighter color and a more pronounced terpene note, whereas oils distilled from old roots are darker, of higher specific gravity and lower optical rotation. These oils possess a characteristic musk-like odor which is caused by the preponderance of oxygenated compounds, especially lactones.

According to Gildemeister and Hoffmann,[2] fresh angelica root, upon steam distillation, yields 0.10 to 0.37 percent of essential oil; dried root, 0.35 to 1.00 percent.

According to the author's experience, the yield of oil from normal, dried root varies between 0.40 and 0.50 percent; that from aged root is around 0.37 percent.

Distilling angelica root in France, the author found that the process should last at least ten hours. Prolonging operation to 24 hours, he obtained oils of superior quality. These contained a relatively large

amount of higher boiling compounds, particularly lactones, which are the most important and characteristic constituents as far as odor and flavor are concerned. These oils had a higher specific gravity, higher ester number and a lower optical rotation than those described by Gildemeister and Hoffmann. Their somewhat elevated acid number could be reduced by proper treatment.

Physico-Chemical Properties

Gildemeister and Hoffman reported the following properties for angelica root oil:

Specific gravity at 15°	0.859 to 0.918 (Oils distilled from Thuringian roots often have a lower specific gravity, as low as 0.853.)
Optical rotation	+16°0′ to +41°0′ (French oils, even when freshly distilled, sometimes possessed considerably lower rotation.)
Refractive index at 20°	1.476 to 1.488
Acid number	Up to 5.0
Ester number	12.0 to 39.0
Ester number after acetylation	30.0 to 75.0
Solubility	Soluble in 0.5 to 6.0 vol. and more of 90% alcohol, sometimes with slight opalescence.

Angelica root oils distilled by Fritzsche Brothers, Inc., from European, mostly Belgian, root materials had properties which varied between these limits:

Specific gravity at 15°	0.907 to 0.936
Optical rotation	+0°50′ to +14°26′
Refractive index at 20°	1.4813 to 1.4870
Acetylation number	7.3 to 16.4
Saponification number	44.7 to 81.5
Solubility at 20°	Soluble in 0.5 vol. and more of 90% alcohol.

Antoine Chiris[3] observed the following properties for angelica root oil:

Specific gravity at 15°	0.863 to 0.875
Optical rotation	+19°0′ to +25°0′
Refractive index at 20°	1.479 to 1.482
Acid number	Up to 2.4
Ester number	11.0 to 19.0

Antoine Chiris also described oils distilled from root which had been stored for a long time. They had quite different properties, for instance:

Specific gravity at 15°	0.938
Optical rotation	+0°26′
Refractive index at 20°	1.4922
Acid number	14.7
Ester number	47.6
Solubility	Soluble in 1.5 vol. and more of 80% alcohol.

Three angelica root oils distilled by the author in France had these properties:

	I	II	III
Specific gravity at 15°	0.936	0.917	0.909
Optical rotation	+3°40′	+8°32′	+2°30′
Refractive index at 20°	1.4870	1.4881	1.4813
Acid number	16.4	15.4	12.6
Saponification number	81.5	70.0	62.5
Solubility	Soluble in 0.5 vol. and more of 90% alcohol.		

Oils distilled from aged root material are by no means inferior; they are usually as good as if not superior to, oils from fresh roots because of their very pronounced musk-like odor. They possess less terpene character than oils from fresh root, the latter resembling the seed oils as far as odor and flavor are concerned. The author is of the opinion that a high content of oxygenated compounds in angelica root oil is preferable to a terpene character because the latter can always be obtained by the use of angelica seed oil.

The physico-chemical properties of angelica root oil change as the oil ages. Under the influence of light and air, the color turns darker and the optical rotation decreases considerably. Gildemeister and Hoffmann, for instance, reported that the rotation of an angelica root oil changed from +27°0′ to +8°0′ in the course of a six-year period. It is an interesting fact that the rotation of Manila elemi oil is affected similarly and, since both oils contain phellandrene, the conclusion suggests itself that the change may be caused by phellandrene. Experience shows that the optical rotation of elemi oil fractions particularly rich in phellandrene slowly decreases with age.

Adulteration of Root Oil

The most common form of adulteration is the addition of phellandrene isolated from other, lower priced essential oils. Phellandrene being a natural constituent of angelica oil, it is difficult, if not impossible, to prove the addition of only moderate amounts. This is another reason why preference should be given to angelica root oils with a high content of oxygenated compounds and a low content of phellandrene.

Occasionally, angelica root oil is adulterated with lovage root oil. In fact, the latter represents a common adulterant because of a certain similarity between the two oils; both contain high boiling lactones. The addition of lovage oil would increase the specific gravity and especially the refractive index of angelica root oil, but these deficiencies could be "remedied" with phellandrene. In other words, the skilled sophisticator has

Field of angelica

little difficulty in preparing lower priced oils which meet all the requirements of a routine analysis. In the evaluation of angelica root oils, therefore, it is advisable not to rely too much on analytical data, but to depend rather on careful odor and flavor tests.

Chemical Composition

The lower boiling fractions of angelica root oil, which consist of terpenes, have been investigated by Beilstein and Wiegand,[4] by Naudin,[5] by the Schimmel chemists[6] and by Haensel.[7] The higher boiling fractions, responsible for the musk-like odor of the oil and consisting mainly of lactones, have been investigated by Ciamician and Silber,[8] by Bocker and Hahn,[9] by Kerschbaum[10] and by Späth and Pesta.[11] The Schimmel chemists[12] also identified a few constituents in the distillation waters.

So far, the presence of the following compounds has been established:

d-phellandrene—It is not yet certain whether d-phellandrene is the only terpene occurring in angelica root oil, as Haensel[12] believed, or whether it contains also small quantities of other terpenes—pinene, for instance.

Osthol—The γ-lactone $C_{15}H_{16}O_3$ found by Böcker and Hahn[12] was identified by Späth and Pesta[12] as osthol, which also occurs[13] in the roots of *Imperatoria ostruthium*. Dried angelica root contains about 0.2 percent of osthol.

Angelicin—Aside from osthol, Späth and Pesta[13] found in the same fraction of angelica root oil other lactones, one which they identified as $C_{11}H_6O_3$ and named angelicin (furo = 2′,3′:7,8 — cumarin). Späth and Pailer[14] succeeded in synthesizing this compound. Angelicin is the parent substance of a number of other natural furocumarins, such as, isobergaptene and pimpinellin.

Hydroxypentadecylic acid and methylethylacetic acid—These acids were isolated by Ciamician and Silber[14] and by Kerschbaum[14] after saponification of the high boiling fractions with alcoholic KOH. Very likely hydroxypentadecylic acid, as well as some higher and lower homologues, does not occur as such in the oil but as γ-lactone.

It is interesting to note that hydroxymyristic acid, the next lower homologue of hydroxypentadecylic acid, has been identified in oil distilled from angelica seed. The peculiar, aromatic, musk-like odor of angelica root and seed oils is probably due to the presence of these lactones which contain more than twelve carbon atoms in their chains.

Diacetyl, methyl alcohol, ethyl alcohol, furfural (a base of pyridine-like odor)—All occur in the distillation water, according to the Schimmel chemists.[14]

Spä and Vierhapper[15] identified in angelica roots three coumarin derivatives, namely, angelicin, osthol (see also above), and osthenol $C_{14}H_{14}O_3$, which is the methylether of osthol. The content of these lactones in the volatile oil of angelica root depends evidently upon the length of distillation and the steam pressure applied, since these compounds possess relatively high boiling points and are not readily volatilized by steam.

Angelica Seed Oil

According to Gildemeister and Hoffmann,[16] steam distillation of angelica seed yields 0.6 to 1.5 percent of oil. Angelica seed distilled in the French factory of Fritzsche Brothers, Inc., gave yields ranging from 1.2 to 1.8 percent.

Gildemeister and Hoffmann[26] reported the following properties for angelica seed oils:

Specific gravity at 15°	0.851 to 0.890
Optical rotation	+11°0′ to +13°30′
Refractive index at 20°	1.484 to 1.491
Acid number	Up to 2.2
Ester number	15.0 to 30.0
Ester number after acetylation	27.0 to 49.0
Solubility	Soluble in 5.0 to 9.0 vol. of 90% alcohol, sometimes with opalescence or turbidity.

A few lots of angelica seed oil distilled under the author's supervision in Seillans (Var), France, had these properties:

	I	II
Specific gravity at 15°	0.855	0.862
Optical rotation	+15°0′	+14°31′
Refractive index at 20°	1.4840	1.4848
Acid number	1.4	1.4
Saponification number	14.0	23.8
Solubility	Slightly turbid in 10 vol. of 90% alcohol.	
	III	IV
Specific gravity at 15°	0.856	0.860
Optical rotation	+14°50′	+14°46′
Refractive index at 20°	1.4840	1.4858
Acid number	1.1	2.8
Saponification number	14.8	21.5
Solubility	Soluble in 4.5 to 5.0 vol. and more of 90% alcohol, with slight turbidity.	

Closeup of angelica plant

Angelica seed oils distilled by Fritzsche Brothers, Inc., had properties which ranged between the following limits:

Specific gravity at 15°	0.855 to 0.881
Optical rotation	+3°44′ to +15°0′
Refractive index at 20°	1.4840 to 1.4898
Acetylation number	1.1 to 2.8
Saponification number	14.0 to 22.4
Solubility at 20°	Incompletely soluble in 10 vol. of 90% alcohol.

The most frequently encountered adulterant of the seed oil is phellandrene. Moderate additions are difficult to detect because the oil contains phellandrene as a natural constituent. As with the root oil, it is advisable to rely upon a careful organoleptic examination.

The investigations on angelica seed oil, as carried out by Mueller,[17] by Naudin,[18] and by the Schimmel chemists,[6] were less successful than those on the root oil. The two oils seem to be composed similarly, but the seed oil contains more terpenes and the root oil more oxygenated compounds, mainly lactones.

So far, the presence of the following constituents in angelica seed oil has been established:

Phellandrene—This is the only terpene so far identified, but may not be the only one occurring in the seed oil.

Methylethylacetic acid — Identified after saponification of the oil with alcoholic KOH solution.

Hydroxymyristic acid—Identified in the highest boiling fractions, also after saponification of the oil. Its next higher homologue, namely, hydroxypentadecylic acid, occurs in the root oil, probably as γ-lactone.

In this connection, see also the work of Noguti and Kawakami[19] on the chemical composition of an ether extract of the fruits of *Angelica glabra* Makino.

Späth and Vierhapper[15] isolated from angelica seed the following coumarin derivatives: Imperatorin 0.5 percent, bergaptene 0.1 percent, umbelliprenin (farnesyl ether of umbelliferone) 0.04 percent, xanthotoxin 0.02 percent, xanthotoxol 0.02 percent, and a phenol $C_{12}H_8O_5$, m.p. 224-226°, 0.03 percent. This phenol is probably not contained as such in the seed of angelica and may have been formed during distillation in high vacuum. For example, imperatorin, on distillation, is converted to the phenolic alloimperatorin.

American Angelica Oil

Stockberger[20] reported that angelica thrives best in a moderately cool climate and may be grown in any good soil, although a deep, fairly rich, moist but well-drained loam gives best results. The soil should be deeply plowed and well prepared

(*Turn to page* 218)

25 YEARS Of Food Processing

Producing from 15.7 to 21.7 percent of all U. S. manufactured products, the food industry appears here to have fluctuated, over the past 25 years, in direct ratio to the nation's income

By G. L. LEFFLER and M. V. BROWN
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Pennsylvania State College, State College, Pa.

AN examination of trends in the manufacture of food and kindred products since 1919 reveals that many changes have taken place in this key industry. The food products industry is the largest manufacturing industry in the country. Its nearest competitor is steel. In 1939 (latest census data) the industry turned out $10,512,802,000 in value of products, which was 60 percent in excess of the production of the iron and steel industry.

Between 1919 and 1939, the value of food and kindred products varied from $6,636,000,000 per year to as high as $12,748,000,000. During World War II a further expansion took place. Although no census data later than 1939 are as yet available, it is known that manufacturers' shipments of food products in 1944, for example, were 115 percent above the 1939 level.

From 1919 to 1939 the industry produced, on the average, 18.7 percent of all manufactured products. Its share of manufactured products was greater between 1929 and 1939 than it was between 1919 and 1929. Hence, the industry gained in relative importance in the 10 years ending in 1939. This was because food production fell less in the depression than did manufactured products as a whole, and because the malt liquor and wine industries were revived by the end of prohibition.

There are 39 leading food and kindred products industries. These have shown diverse trends in relative and absolute importance since 1919. The following is a list of industries that have shown gains in relative importance in the period since 1919, measured as a ratio of value of products in the industry to the value of products for all food and kindred products industries:

Indexes of Food Manufacturers' Shipments, Wage Earners and Payrolls

Year	Manufacturers' shipments	Wage earners	Payrolls
1939	100	100	100
1940	106	101	103
1941	134	110	121
1942	177	120	150
1943	194	122	179
1944	215	125	199

Bread and other bakery products; cane sugar, except refining (since 1925 only); canning and preserving; chewing gum; condensed and evaporated milk (since 1925 only); malt; malt liquors; poultry dressing and packing; quick-frozen foods; sausages, sausage casings and prepared meats; wines.

By the same measure, the following industries have shown downward trends from 1919 to 1939:

Baking powder, yeast and other leavening compounds; candy and other confectionery products; cane sugar refining; chocolate and cocoa products; corn sirup, corn sugar, corn oil and starch; creamery butter (since 1925 only); flour and other grain mill products; ice, manufactured; meat packing, wholesale; oleomargarine; rice cleaning and polishing; vinegar and cider.

The other 16 industries either showed no definite upward or downward trend in relative importance, or else census data are not complete for the period.

In 1939 there were 51,165 food manufacturing plants, or about 28 percent of all manufacturing establishments in the United States. At no time between 1921 and 1939 was the number as high as the figure of 69,423 reported in 1919, although there is no clear trend that might indicate the number of plants established in that period.

Wage earners in 1939 numbered 816,774. In the previous 20 years the number ranged from as high as 741,000 in 1929 to as low as 638,000 in 1933. During the war the total was estimated at 1,021,000. The food industry is the third largest employer of labor in manufacturing, being outranked only by steel and textiles.

The total volume of wages paid in the industry has shown a steady upward trend from 1919 to 1944, interrupted only temporarily by business depression. Wages paid in 1939 were $905,884,000, or higher than in the fine year of 1929. By 1944 they had risen to $1,802,000,000, almost double the 1939 figure. The food products industry is the second largest in the country in volume of payrolls, being exceeded only by the steel industry. Annual wages in the industry ranged from as low as $933 per wage earner in 1933 to as high as $1,209 in 1929. During the war a further advance took place, and by 1944 they were slightly above $1,700.

Taking the entire food and kindred products industry as a whole, wage costs per dollar of finished products in 1939 averaged 8.6 cents. Individual food industries ranged from as low as 2.7 cents for flavoring extracts to as high as 35.6 cents for wholesale custom slaughtering.

Manufacturing Statistics of Food and Kindred Products Industries.

Year	No. of estab.	Wage earners	Wages paid (000's)	Value of products Amount (000's)	Value of products Percent of all U.S. mfg. products
1919	69,423	733,664	$774,724	$12,748,348	20.5
1921	52,113	626,618	746,266	8,267,130	18.9
1923	51,847	682,137	795,571	9,524,051	15.7
1925	48,113	664,760	793,681	10,418,536	16.6
1927	48,947	668,311	817,238	10,668,009	17.7
1929	55,325	740,937	895,713	11,658,705	17.1
1931	47,812	638,240	730,467	8,005,389	20.1
1933	40,325	668,927	624,212	6,636,012	21.7
1935	48,591	786,073	791,271	9,291,010	20.6
1937	48,402	877,194	967,265	11,037,332	18.2
1939	51,165	816,774	905,884	10,512,802	18.5

Workers, who formerly lugged a lunch box every day, are now sold on the advantages of industrial feeding facilities, thus increasing the market at these outlets.

Mass Feeding Offers Big Market

Substantial growth of the quantity-cookery industry in recent years opens a lucrative market to the food producer who is alert to their special needs. The author explains what some of those needs are

By GEORGE J. KRAFT, President, New Jersey Branch
International Stewards and Caterers Association, East Orange, N. J.

QUANTITY-COOKERY kitchens have become a constantly widening market for food manufacturers. Today, 28 percent of food consumed in the United States is distributed through such kitchens—which include restaurants, industrial cafeterias, railroad and steamship commissaries, and so on, to about 25 classified types. Every factor indicates that the potential of these kitchens is, as yet, far from realized. Here, then, is a market that the food producer will want to develop. And he can develop it by first considering the particular needs of these outlets and then by planning his sales technic and his production to meet those needs as they occur.

How Not to Do It

Imagine yourself in the main kitchen of one of the largest mass-feeding operations in this country. The managing staff and dietitians are to witness a sales demonstration of prepared cake mixes. They are the products of a manufacturer distributing nationally through retail and institutional channels. The salesman demonstrator knows his prices, terms, and has a memorized outline of the product's merits.

As his talk proceeds, a dietitian interrupts to suggest that the oven thermostats be regulated so we'll have the proper temperature when the batch is ready for baking. "What temperature? Oh, yes! It must be on the instructions label." A minute passes while he scans small print and then finally: "Sure, here it is. A moderate oven, 325 deg. Will you adjust the oven for me, please?" Of course, we help. But from here on it is apparent that this salesman is lost in a commercial kitchen. The actual application of his products to our needs in quantity-cookery are out of his world. The equipment, measurements, utensils and heat controls are

to him as farming implements would be to a fisherman. His lack of technic in handling food would be on a par with a city-slicker's attempt to milk a cow. Finally, we test the finished product and by this time our visitor is frustrated. He whines, "If one of your own bakers had prepared these items, I'm sure they'd have come out better." At this important phase in his presentation he admits that he hasn't done much of "this sort of thing," although he and his wife had "experimented at home" with good results. He begins to apologize when he should be selling. He is negative when he should be positive. This man with all the outward characteristics of being a good salesman is now covered with cold, nervous perspiration at a time when he should be hot with enthusiasm. You know the result. No sale!

Another Fumble

The company decides that a factory representative is the man for us. Again we are in the main kitchen. This time our chef and his staff are also present. Mr. "Factory Man" arrives from the research kitchen of his home office. He slips into our storeroom for a minute and changes into a fresh white uniform. His accent and efficient "stove-side" manner indicates that he served his apprenticeship many years ago. He knows his way around. He is fast. Every move counts. His technic is good—so good, in fact, that we learned some knacks we hadn't seen before. The finished product turns out fine—better than our own, we agree. He wipes his hands, swings off his apron with a triumphant gesture, and says, "There you are, the finest you have ever tasted!" He is right, but his lack of tact makes him wrong. He fails to sell. Our kitchen staff feels they have been "shown-up." The sales department follows up this demonstration. But again, no sale!

These true-to-life illustrations indicate that regardless of the fine quality, utility or actual value of your products, your production volume depends on sales volume. The efficiency of your sales effort will be measured by both the selling ability and technical food knowledge applied to the task. Both are essential because we are discussing a specialized field that will be increasingly important to you.

Key to Approach

To understand the sales problems involved in reaching this fertile field, we must bear in mind the unique fact that the restaurant operator is a manufacturer as well as a retailer. Practically all the foods purchased will be processed and combined with others before resale to the ultimate consumer. This fact makes it different from the retail grocery business in many ways, including such phases as purchasing, inventory control, storage, processing or cooking, merchandising, packaging service, sales promotion and consumer demand. No subject as comprehensive and complex as the quantity cookery market can be analyzed completely in a single article. However, to be as generally practical and helpful as possible, here are a few considerations:

Purchasing—It is significant that about 75 percent of all the food sold to this market is purchased by approximately 25 percent of the quantity-cookery accounts. Concentration of market is, therefore, an important factor. Also, bear in mind that the average home maker buys and cooks for three to five persons, whereas the purchase and preparation of food in a single restaurant operation may be for 50 to 40,000 people daily, with purchases controlled by the decisions of from one to four key individuals in each account. Purchasing responsibility varies.

In some organizations, the manager assumes the responsibility. In others, it is the steward or chef. Occasionally, a purchasing agent has the authority. However, standards and agreements generally require the approval of a management executive. Regardless of who has the final say, the steward and chef exert strong influence on product preference. They

The market, here, must be reached through the very few, who purchase and cook for the very many. The dining patron does not care whose brand it is, but only whether it is good.

pass judgment on quality. They plan and execute the means which determine what particular products will be "exposed" to the consuming public. It is they who convert, process, serve or use all purchased items skillfully, so the best qualities will yield a palatable meal to satisfy guests.

Quality merchandise is an important factor with successful accounts. They know how to make it yield profits, volume and requests for "seconds." They know, too, that repeat business is vital to continued profits. All concerned, from consumer to source of supply, benefit.

Inventory Control—Stock is generally limited to one or two brands for any specific item. Therefore, a particular brand is purchased in substantial quantities, and it moves with a short shelf life in the storeroom. Stocks of perishables are considered for use daily, because the daily menu specials must move the contents of the refrigerators. The presence of food in a commercial kitchen means one thing—sell.

I'd venture to say that a chef or steward knows more about the contents of his refrigerator than the average housewife does about hers. There is less waste, less "hanging around." Every morsel of food is considered in terms of its monetary value. So it moves. This fact influences ordering, delivery schedules and service, and stock rotation.

Storage—There are many practical things, involving knowledge rather than expense, that manufacturers can do to enhance the appeal of their products. For example, where applicable, flat-sided containers would have advantages over the round ones in shipping space, storage space, and for easier stacking on shelves or in refrigerators. Where storage space is at a premium, a flat container can be placed into a restricted area in several positions without any rolling around. Possible destruction of merchandise or injury to someone is thus avoided.

Processing and Cooking—Space permits only a pinpoint scratch on the surface of this fascinating subject. Visualize the quantity-cookery kitchen as a manufacturing unit, with the variety of items in production changing daily, with demand fluctuating by the hour as a result of sudden weather changes and other uncontrollable factors. Consider the coordination required to bring a line of varied products to the peak of perfection and completed production within a matter of minutes of delivery (serving) time. A half hour later or tomorrow is too late. Demand is irregular and impatient.

In these kitchens you find skilled culinary craftsmen working under the pressure of close time schedules. It is apparent that dependability of sources of supply and efficient equipment are of prime importance. These people are serious professionals. Pride in performance runs very deep.

I recently saw a chef work feverishly to complete a Hollandaise sauce in time for a special banquet. This man, an artist with food, could not keep the sauce from "breaking." There was no time to start over with a new batch. In a rage, the chef threw the pot with its disappointing contents clear across the kitchen.

Was he one of those temperamental chefs you've heard about? I wouldn't judge him so. He had no time for mistakes. Every second counted. He was under high pressure. After improvising with melted butter for the service and assigning someone to clean up the mess, he made an inspection of the raw materials used in the ill-fated sauce.

Analysis revealed that most of the eggs delivered that morning were not fresh and up to standard. Considering this chef's pride in his reputation and the disappointment of guests who planned the banquet, what do you think happened to the dealer who delivered eggs that fell below the purchase specifications?

Merchandising—This phase of the operation is radically different and more complicated than retail-store merchandising. The approach requires specialized knowledge. Since this business involves manufacturing as well as retailing, most items purchased are processed with other items. In addition they are sold in a variety of combinations with other finished products. Some sales are *a la carte,* others are "packaged" sales, the so-called *table d'hote* meals. Compare that with the operations of a grocer, who simply adds his mark-up and lets it go at that.

Successful restaurateurs are percentage wise. They figure cost of raw materials used, net yield, labor cost, processing costs, service costs. Cost percentages are established for all factors. Then variables are controlled so that ratios will be maintained in a favorable balance. The manufacturer should know whether his products are staples or variables. Even if the prices are stabilized, will the net yield vary? Under what conditions? What relationship will the cost of his products have to the food cost and labor cost of the prospect's finished products, to the finished complete meal, to the net profit? Smart manufacturers will have trained representatives who understand how their products fit advantageously into this picture.

Consumer Demand—Brand-name merchandise loses its identity by the

(*Turn to page* 220)

Stock, in this market, is generally limited to one or two brands for any specific item and is purchased, therefore, in substantial quantities for short life in the store room.

EDITORIALS

LAURENCE V. BURTON, Editor

Why Fat, Sugar and Meat Are So Important

OUT of the tremendous problems of directing the nutrition of the British people during the war, Sir Jack Drummond, Scientific Advisor to the Ministry of Food, learned one principle that may be considered applicable to all white people.

"Dietary habits," he says, "can be changed only in the direction of a more pleasing diet." This is his way of stating what FOOD INDUSTRIES has long maintained: namely, that people eat what they want, not what they need; or, that better nutrition must follow improved flavor.

Sir Jack also finds that fat, sugar and meat are the things that make a plain—even a peasant diet —seem worth eating. Without these three items, our food would be so unappetizing that not enough would be consumed for adequate nutrition.

A New Abstract Periodical

REFRIGERATION ABSTRACTS is the name of a new abstract journal that is being published quarterly by The American Society of Refrigerating Engineers, 40 West 40 Street, New York 18. Professor J. Mack Tucker, University of Tennessee, is editor. Subscription prices: domestic, $7.00 a year; foreign, $8.00 a year. In appearance it resembles the well known Chemical Abstracts but is designed primarily for the use of members of ASRE. This means that emphasis is placed on engineering. Like Chemical Abstracts it is a bit disappointing in that many an article that has an interesting title is reported only by title. Nevertheless it is an excellent job, one that will be of material aid to those who must keep abreast of everything, including patents, in this rapidly growing field.

Vitamin A to Prolong Life

ADDITION of larger amounts of Vitamin A to the diet, resulting in increased longevity of rats, one of the results of research which has been aided by financial grants from Nutrition Foundation, Inc., merits attention here. It not only affords a way to increase service to consumers but also should be very suggestive to those who are seeking new ideas to promote increased consumption of certain foods.

The average life span of 163 female rats on a diet of 3 International Units of vitamin A per gram of food was 724 days but when the diet contained 6 I.U. per gram, 165 females averaged 801 days of life and, when the vitamin A content was doubled again to 12 I.U. per gram of food, 36 females lived an average of 830 days before dying. Male rats were shorter-lived but the corresponding figures are equally impressive. On the 3 I.U. diet, 112 males averaged 652 days of life, on a doubled vitamin A intake 108 rates averaged 685 days but, by redoubling the A intake, 24 male rats averaged 723 days of life span.

The work done by H. C. Sherman and associates at Columbia University suggests that female longevity can be upped 14 percent and male longevity can be upped 10 percent by doubling the Vitamin A in the diet above the recommended allowances of The National Research Council. The report, published in Proceedings of the National Academy of Sciences 31, 107, 1945 points out that these spectacular gains are obtained largely by the use of the vitamin itself rather than the provitamin.

Translating the results from rats to man is interesting. The basal diet for rats would correspond to 2,400 I.U. per day for a man consuming 3,000 Calories per day, but 4,800 I.U. (6 I.U. per gram) is the recommended allowance by NRC. Sherman, *et al.*, suggest that it could be made much higher with consequently beneficial results.

If, on further experimentation and mature reflection, the desirability of greater amounts of Vitamin A (rather than the provitamin) in processed foods is found to be commercially desirable, then comes the need for careful research in packaging and processing of the high-A food. Vitamin A is notoriously easy to oxidize by contact with air, and once oxidized, its value is lost. Furthermore, this vitamin is fat-soluble and will be found most frequently in fatty foods or fatty components. Unless the Sherman conclusions can be attained equally as well with the provitamin it is certain that the packaging and preservation problems are going to need much study before they can be solved in an economic manner.

Faster Curing Yet Better Quality Cheese

IN view of the current scarcity of cured cheese, now is the time for cheese makers to improve their technology and capture profits in a way hitherto not possible.

The State of Wisconsin is preparing to take the initiative in the matter, but why should anyone wait for any branch of government to do the job? Wisconsin is going to try to improve the quality of milk supply for cheese makers through measures taken on the farms. Commendable though this may be, it is only a part of the job.

Granted that industrial food processing cannot improve the quality of the raw material, the processing methods, nevertheless, have possibilities that cheese makers are slow to apply. Cheddar cheese made from raw milk must be cured and aged at low (36-40 deg. F.) temperatures to get

a good, sharp cure. At higher temperatures, the gas forming bacteria which are still alive may cause bitter flavors and often cause a spongy swelling of the cheese. The trick is to hold the temperatures of storage low enough so that bacterial action is so very slow that any gases may diffuse out of the cheese without causing voids or holes. In time, these coliform organisms die off and a fairly good cure and flavor develops after about a year. If one wants something that is very sharp, the aging time required is from two to four years.

Interest and cold storage charges on a carload of cheese in cure for, say, two years are a large item. The time and storage costs can be reduced by curing at higher temperatures, but until fairly recently the quality often suffers and may cancel out any gains.

But when cheddar cheese has been made from pasteurized milk, by a process developed in the Bureau of Dairy Industry, U. S. Department of Agriculture, the young cheese may safely be stored at 50 to 60 deg. F. and sharp-cured in a period of a very few months. By the correct use of food technology a better average cure can be obtained at 60 deg. F. than was ever possible under older methods at 40 deg. F.

It is to be hoped that a goodly number of cheese factories will see the wisdom of adopting the newest methods of quality-control. The current demand for sharp-cured cheese is very strong and cost of new equipment can be easily recovered by prompt action.

Maybe This Explains Communism

AN officer, returning from North Africa, tells of this incident that occurred at Casa Blanca shortly after the conference of Roosevelt, Churchill and Molotoff. A large group of malcontented native laborers, regarding themselves as Communists, had been hired for pay by the U. S. Army. They had struck repeatedly for more money, more food and less work. They had wasted hours of precious time in endless arguments.

Their principal gripe was that the American way of hurrying to get the job done was all wrong. Communism was better. Under Communism everybody shared alike, nobody had to do very much. The government provided for everybody.

So when they learned that a group of Russian officers were at Casa Blanca, a delegation of the striking Communistic natives appealed to the officers to intercede for them and make the U. S. Army stop demanding a day's work for a day's pay. When an interpreter had translated their appeal from Arabic to Russian, the senior officer replied:

"You call yourselves Communists! In Russia, we know nothing but work, hard work! You do not like to work! You are not Communists! We shall have nothing to do with you!"

After that complete disavowal, the natives resumed work and kept busy until the memory wore off. Then they became again, what they called "Communists."

Caution to Precooked Food Freezers

Two timely notes of warning that sounded at the recent meeting of the American Society of Refrigerating Engineers deserve re-emphasis here.

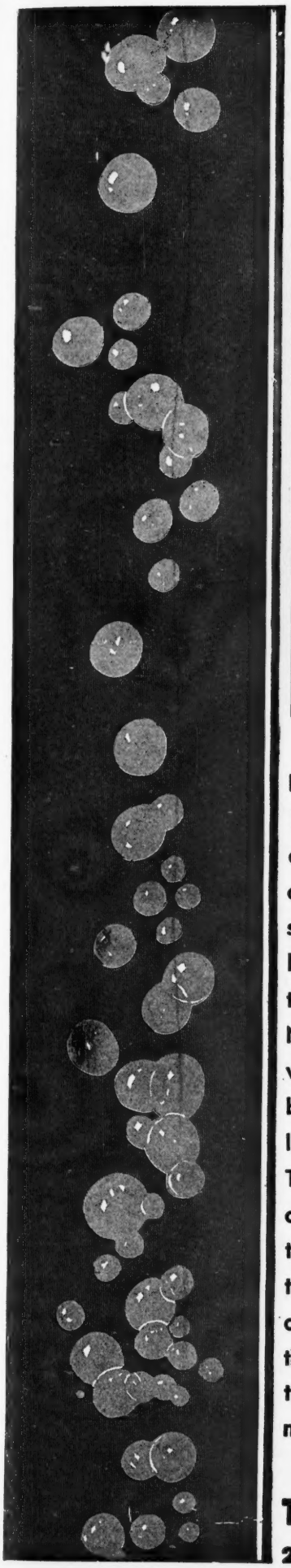
Clifford Evers, of Birds Eye Frosted Foods Corp., warned that those energetic, but technically uninformed, persons who were going in for production of precooked frozen foods should study the problems of deterioration of quality, during freezer storage, before embarking on a commercial-scale venture. Many, he said, would find that there is much more to this new form of enterprise than the mere freezing of a delectable food item. If any quantity of off-quality frozen mechandise is foisted on the public the entire industry will suffer for years. To this sage counsel we wholeheartedly subscribe. We also reiterate what we once said about the business of dehydrating vegetables—it is not "duck soup." In fact, the technological and engineering problems of precooked frozen foods are likely to surpass anything previously known in the food processing industry.

Another warning was about the sketchy training of refrigerating engineers in some institutions of unquestioned repute. This warning also included some "vocational schools" which are endeavoring to capitalize on the current interest in frozen foods by starting courses of "instruction" in refrigerating engineering and food freezing particularly for the discharged veteran. Here, he and his money may soon be separated without much knowledge gained in return. The warning is repeated here lest some unwary new entrant into the frozen food industry may rely on such superficial guidance in technological matters.

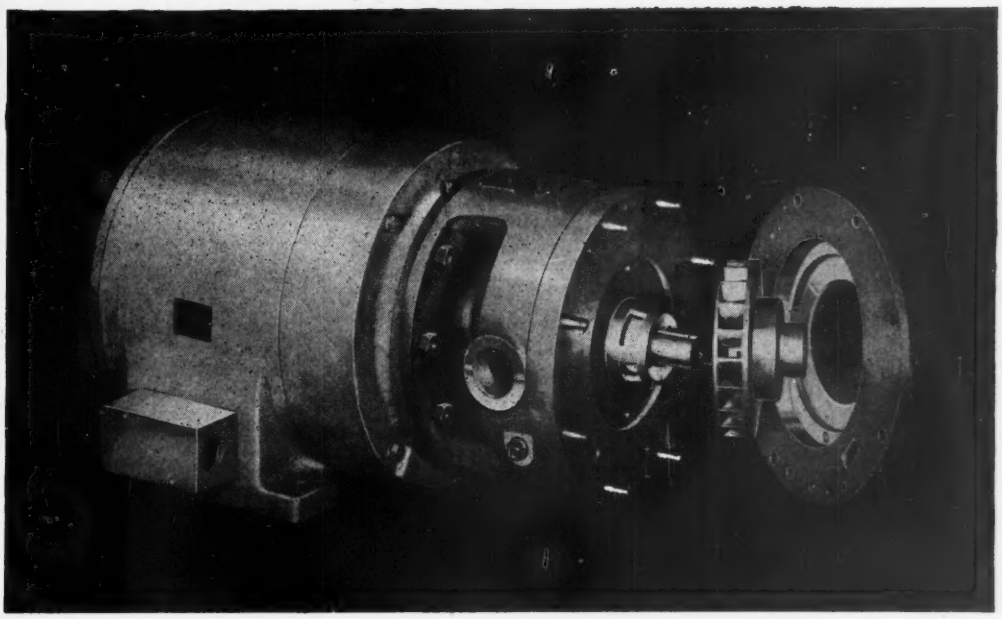
The frozen food business is due for tremendous activity in the next few years, but unless the firms entering this field exercise the greatest care and foresight, their opportunities may easily be ruined. And, unfortunately, there are not enough capable, well-trained, food technologists and engineers to supply the demand.

The situation is not, however, hopeless. There are a few expert consultants whose advice may be had for a fee. In our judgement, when it comes to the intricate technical problems of the newest branches of the food processing industry, a part time consultant at a high fee is far more valuable than the full time, low cost person who has not been thoroughly trained in the fundamental sciences.

It is well to recall that in the frozen food field there is only a very minimum of prior art (accumulated human experience) compared to the many centuries of prior art in a field like baking or wine making. The ASRE warnings are very timely.



ONLY CLEAN AIR CAN REACH YOUR PRODUCT FROM A NASH COMPRESSOR



Here is a compressor designed perfectly to meet the needs of the Food Plants. It is simple, for it has only one moving part, a rotor cast in one piece and rotating in the casing without metallic contact. This means trouble-free operation over long periods. It is compact and requires little valuable floor space. Its oversize ball bearings seldom require attention or lubrication. No lubrication is required in the interior, so that the air is kept clean from the time it enters the pump. • But this is not all. The compressing medium in the Nash Pump is a rotating column of clean water. The air is in intimate contact with this water in passing thru the pump and is actually scrubbed while it is being compressed. Dust present in the atmosphere is removed, and the air delivered free from dirt, oil, or heat, without the use of scrubbers or air washers. Think what this means in terms of purchase cost and floor space occupied by complicated air washing apparatus. • These pumps are proving their worth in the most trying service. They are ideal for transferring beer or wort from tank to tank by air pressure, for maintaining pressure on aging tanks, for supplying compressed air to bottling machines in racking, etc. • Available in any capacity, these pumps deliver pressures up to 40 lbs. absolutely uniform without storage tanks. • You want the most reliable pumping equipment in your plant, so by all means find out more about the Hytor. Our catalog No. 217 is free on request.

THE NASH ENGINEERING COMPANY

243 WILSON ROAD • SOUTH NORWALK, CONNECTICUT

NEW PACKAGES & PRODUCTS

Crackers in Color

COOKIES and crackers have been one of the first groups of foods, other than high-priced specialty items, to reflect the opportunity for more interesting designs.

Affiliated Bakers Co., New York, a group of bakers who have combined for exchange of technical information, has adopted new packages for several cookie types. Almost cubical folding boxes, 5x5x5½ in., holding 1 lb. each, are patterned quite differently but in the same colors—yellow, a reddish brown or orange, and a dark blue.

Scotch oatmeal cookies have a plaid background, with figures in old-fashioned dress. The cookies are machine deposited, about 1½ in. in diameter, the oatmeal being fine cut and mixed with wheat flour, hydrogenated shortening, corn and cane sugars, skim milk solids, whole eggs, spices and flavorings.

Lady Luck Bridge Cookies, very short, use a dark blue box decorated with full color representations of the product.

Rum and Brandy Spice Drops are generously spiced with allspice, cinnamon, cloves, nutmeg and ginger. The cookies are rolled in a heavy sugar coating. The box for these has a wood paneling background design, with colonial figures.

The initials ABC in linked diamonds appear on all of the packages. Cartons are dull surfaced, with a cellophane overwrap.

Brighter Bits

WITH an eye on the postwar market, Rockwood & Co., Brooklyn, N. Y., has redesigned its container line in bright flag red and white. A feature of the new styling is the brown and red "R" printed on the white band.

The 7-oz., open-end package of Semi-Sweet Chocolate Bits is made of plastic-lined chipboard. Recipes are printed in white on the back.

A new formula has been used to produce the heavy Unsweetened Baking Chocolate. A half-pound cake divided into eight 1-oz. squares is wrapped in a foil and greaseproof paper laminate, within a folding carton.

Rockwood's new Breakfast Cocoa is in an oblong, unlined, spiral-wound chipboard container with metal ends. The glued coated-paper label is outstanding in its simplicity.

All of the items will be overwrapped in heat-sealed cellophane.

Dried Sweets Again

RESEARCH has uncovered the stabilizing value of dehydrated sweet potato flour. It was found that through substitution of the sweet potato flour for gelatine, 100 percent overrun was achieved in less than 3 minutes with typical commercial mixes, without aging.

The flour, properly processed for use as a stabilizer, is being distributed in bulk by American Foods, Inc., Buffalo 2, N. Y., under the tradename of Yamgel.

For Smooth Cream

OH-BOY ICE CREAM BASE contains a balanced mixture of stabilizing ingredients. These are listed as lecithin, calcium, monocalcium phosphate, sodium bicarbonate, algin, karaya gum, locust bean gum, sugar and wheat flour. The presence of the specially processed lecithin in the base makes possible the omission of eggs from an ice cream mix. Recipes on the package call for sugar, evap-

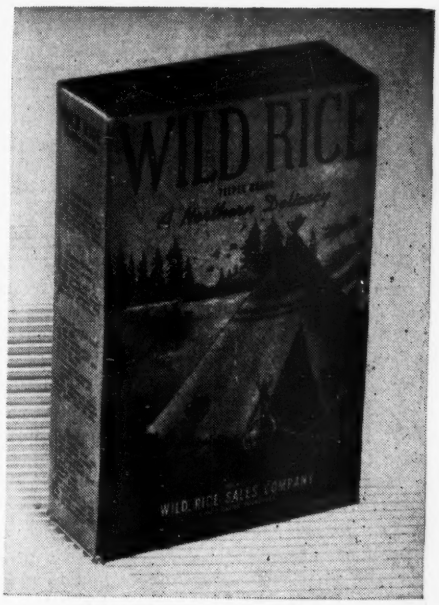
orated milk and coffee cream, with flavoring additions. The result is said to be a really smooth ice cream, even when made in the freezing tray of an electric refrigerator.

The powder contained in one package, ¾ oz., is sufficient to stabilize from 1 to 2 quarts of ice cream, depending on the method of freezing.

A kraft envelope, printed in blue and red, with a picture of a boy eating ice cream, is used by the manufacturer, Oh-Boy Products Co., Hillsboro, Ill.

Scenic Wild Rice

TEEPEE BRAND wild rice now appears in an attractive folding chipboard carton lithographed in red and green on a yellow background. Wild Rice

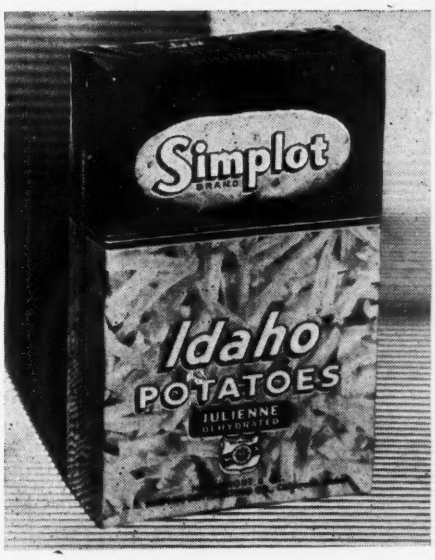


Sales Co., Grand Rapids, Minn., has represented its brand name picturesquely by the Indian scene on the face of the carton, while the back and sides show directions for preparing and recipes and suggestions for use. The wild rice itself is packed in an unsealed cellophane bag. When filled, the carton holds 12 oz.

Civilianized Wrap

FOR dehydrated Idaho potatoes, a chipboard carton prewrapped in wax-coated glassine and overwrapped with reverse-printed cellophane, is both eye-appealing and moisture-proof. It is something new in packaging, since most of the dehydrated potatoes prepared for the civilian trade have been in cans.

A royal blue band circles the upper third of the package upon which is centered a life-like, yellow-brown potato bearing the Simplot name. The rest of the package shows the dehydrated julienne style potatoes in the same yellow-brown. Printing is white and red and directions for cooking are clearly visible on the back.



J. R. Simplot Dehydrating Co., Caldwell, Idaho, the manufacturer, says that the 8-oz. package represents about 4 lb. of raw potatoes.

Tropical and Nice

GROVELAND PRODUCTS CO., Miami, Fla., under the Tropaya brand name, is manufacturing a group of flavoring powders for use in milk drinks.

Coconut, eggnog, banana and Pina Colada flavors are offered. The Frosty powders contain skim milk powder and sugar, with dried coconut, egg yolk or banana powder, respectively. Pina Colada contains dried coconut and has pineapple flavor.

The 9-oz. jars have rubber sealing rings for flavor protection, with yellow and brown labels.

Designed To Show

SOUP'S ON, a product of Universal Foods, Chicago, Ill., contains a blend of egg noodles, dehydrated vegetables, hydrogenated vegetable oil,

No More STONES in Your Bottle-Neck!

• Now, with critical war shortage of labor, streamline STONING in your mill. Removing stones has always been slow, laborious and costly out of proportion to other steps in processing cereals, soy beans, and other dry foods. To eliminate this great headache of the cereal and other dry food processors, we have developed a new type stoner—revolutionary in design, amazing in efficiency, low in first cost, in operation. Removes stones, glass, non-magnetic as well as magnetic metals, and all other hard, dangerous contaminations from cereals, soybeans, and other beans, and other food products with, 1) an action so sensitive the tiniest particles are easily removed; and 2) operating cost so low it is relatively insignificant; and 3) 99.9% efficiency. Capacity up to 16 tons per hour.

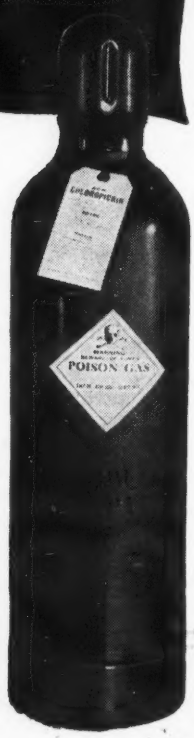
Write for Bulletin FI-146

SUTTON, STEELE & STEELE, INC.
DALLAS, TEXAS
In Canada—Kip Kelly, Ltd., 68 Higgins Ave., Winnipeg
Foreign—Separations Engineering, Ltd., 133 Bush House, Aldwych, London

THESE 2 POWERFUL DOW FUMIGANTS

answer practically every food fumigation problem

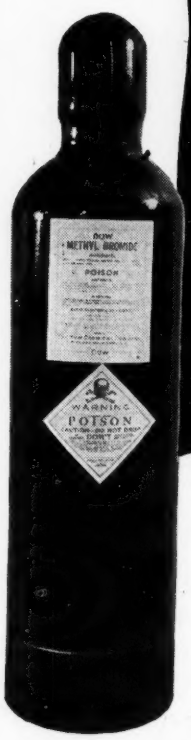
DOW Chloropicrin



This well-known fumigant is especially well adapted for use in buildings not sufficiently well constructed to confine other gases. It is also widely used for rodent control, since very small quantities properly placed, will dispose of them in a hurry. Where "spot" fumigations are desired because of localized infestation, Dow Chloropicrin is thoroughly reliable.

Because of its penetrating power—unmatched by any similar product—Dow Methyl Bromide reaches the center of 140-lb. bags of grain stacked in large piles. It quickly accomplishes a complete kill of rodents and insects in all stages of development and, because it vents rapidly, permits a return to work the following morning.

DOW Methyl Bromide



Additional information on these two powerful answers to fumigation problems is available on request, or Dow can put you in touch with a competent industrial fumigator specializing in the food field.

DOW

CHEMICALS INDISPENSABLE TO INDUSTRY

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MIDLAND, MICHIGAN

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St. Louis • Houston • San Francisco • Los Angeles • Seattle

chicken fat, dextrose, spices and seasonings.

The ingredients are sealed in a 4-oz. moisture- and vermin-proof bag which is enclosed in a red and white outer chipboard folding box. Directions for use are printed in blue on the yellow back of the box.

The company has designed the individual container particularly for use in a new display carton which, by removal of two perforated sections, is made ready for the counter with 12 of the packages.

Universal's Rice Dinner has received similar treatment in a yellow, red and blue color scheme.

Mince Meat Pudding

STEAMED PUDDING that is less rich than a plum pudding, but with a holiday flavor, contains flour, shortening, eggs, leavening, sugar, molasses, mincemeat, additional currants, raisins, spices, and pure apple brandy.

Ready-to-serve Bonnie Day Mince

Meat Pudding comes in a 404 by 304 can carrying a blue and white label. Pak-O-Mud Sales Distributors, Philadelphia, Pa., recommends serving the pudding either hot or cold, 18 oz. providing portions for eight.

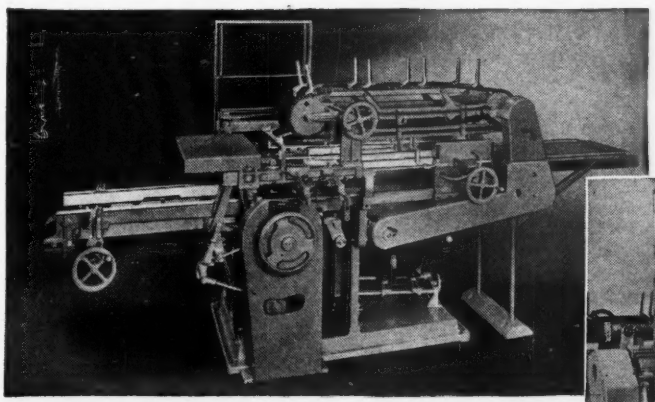
Macaroon Treats

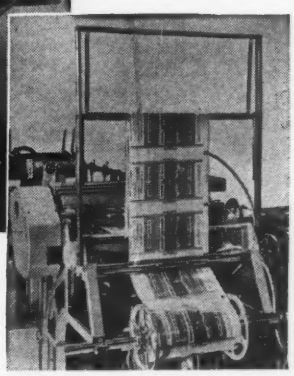
A DRESSED-UP version of the macaroon is presented by Karl Baking Co., Newark, N. J. Fruited Mac's are made with imported Jamaica Rum and Portuguese Brandy, cake flour, macaroon paste, egg white, seedless raisins, diced fruits and artificial flavors.

The container is a friction-top, spiral-wound fiber can with greaseproof paper liner and separate printed paper label in yellow, brown and white. Net weight is 2 lb.

The corrugated shipping container that protects the can on the shelf is labeled and ready for mailing.

It's FAST
Will wrap 100 packages per minute
It's QUIET
No harsh motions—a promise of long life
EXTREMELY ADJUSTABLE
Can be made to accommodate over a dozen sizes





Vertical position of paper slackener saves floor space and is more convenient when changing paper reels.

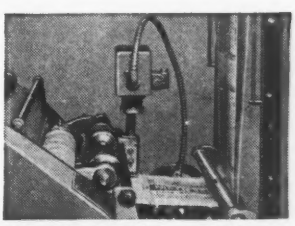
And it sets a new high in wrapping perfection

Here's a machine that answers today's call for better and more efficient packaging—a machine that is adaptable to a remarkably wide range of products and various forms of wrapping.

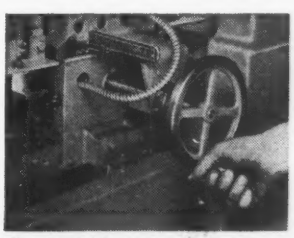
This new FA model embodies the latest and finest in machine design and construction. Just to hear how quietly it turns out 100 packages per minute is convincing proof of its superiority. All harsh motions have been eliminated.

The product is handled with extreme gentleness and always on an even plane. Improved heat-sealing units insure firmer, neater seals. An advanced electric-eye mechanism provides absolutely accurate registration of printed wrapping material in roll form. Its new type paper feed and improved transport mechanism save valuable floor space. And it offers new ease and speed of adjustability—a decided advantage when numerous sizes of packages are wrapped.

Write today for our new FA Leaflet.



Printed material in roll form is accurately registered by electric eye.



Hand-wheels make it easy to adjust machine for different sizes.

PACKAGE MACHINERY COMPANY
Springfield 7, Massachusetts
30 Church St., New York 7 • 111 W. Washington St., Chicago 2
101 W. Prospect Ave., Cleveland 15 • 443 S. San Pedro St., Los Angeles 13
18 Dickens Ave., Toronto 8

PACKAGE MACHINERY COMPANY
Over a Quarter Billion Packages per day are wrapped on our Machines

"Well, *then, suppose* you *set the price*"

THIS hapless mug dickering for the Brooklyn Bridge, isn't, we'd have you know, a Crown customer. Crown customers are smart. That's why they buy from Crown. They realize that Crown's fair price policy is highly advantageous . . . They know that all comers to Crown are treated alike, and treated right! Copy book stuff? Of course! Crown customers have found it a mighty profitable angle. We have and so will you.

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FOOD INDUSTRY NEWS

GENERAL

First Quarter Allocations Reflect Improved Meat Supply

Pork production should increase, while beef continues heavy, but fewer sheep will cut lamb and mutton output

ALLOCATIONS of meat for first quarter 1946, which will allow U. S. civilians consumption at an average annual rate of practically 150 lb., has been announced by the Department of Agriculture. Civilian allocation is virtually the same as for the final quarter of 1945, but is 18 lb.—on an annual per capita basis—above that for first quarter 1945.

The total supply of meat available for allocation in January-March 1946 period is estimated at 5,970,300,000 lb. carcass weight. This compares with 6,458,600,000 lb. (including military stocks) allocated in October-December, and with estimated disappearance of 6,106,600,000 lb. in first quarter of 1945, when military takings were heavy.

By claimant groups January-March allocations have been made as follows: civilians—5,003,400,000 lb., or 83.8 percent of total allocation; military and war services —483,400,000 lb., or 8.1 percent; foreign shipments and U. S. territories—483,500,000 lb., or 8.1 percent.

Approximately 483,500,000 lb. of meat from first quarter production has been allocated for foreign shipment in January-March quarter, a large part of which is designated for countries served by UNRRA. Allocations for exports and foreign shipments includes: Belgium, 44,000,000 lb.; France, 46,000,000 lb.; Netherlands, 15,000,000 lb.; Netherlands East Indies, 20,000,000 lb.; UNRRA countries, 300,000,000 lb.; U. S. territories and other commercial shipments, 58,500,000 lb.

Department officials stated that tentative allocations for year 1946 meet practically all requirements for foreign shipments from the U. S. insofar as financial arrangements can be anticipated at this time. For the entire year, U. S. plans to furnish almost half the meat to be made available for France, Belgium and the Netherlands, and more than 80 percent of meat for UNRRA. The balance of their imports are expected to come from Argentina, Canada, Australia, New Zealand and Denmark.

In addition to 483,000,000 lb. allocated from current production for foreign shipment in next quarter, it is expected that approximately 200,000,000 lb. of the October-December 1945 allocation for foreign shipment will be exported in January-March period, and allowance for this has been made in determining allocation.

The 483,400,000 lb. allocation for military and war services is slightly higher than 445,100,000 lb. allocated for this purpose in October-December 1945 quarter, but is only 36 percent of 1,337,100,000 lb. procured in first quarter of 1945.

Total meat production in 1946 is currently estimated at 23,000,000 lb., about 800,000,000 lb. more than in 1945. Marketings of beef cattle expected to continue large, but output of lamb and mutton will be reduced in accordance with decline in sheep numbers this year. Pork production should be moderately larger than in 1945.

Lifting of Controls Asked By Butter Inst.

GOVERNMENT CONTROLS on dairy products, price support program, butter quality, and sanitary practices on dairy farms, cream receiving stations and in butter plants, were the subject of greatest interest on the program of the 37th annual meeting of the American Butter Institute in Chicago November 26 and 27.

Removal of all controls, including ceiling prices on manufactured dairy products, was requested so that the marketing of milk products might return to a basis of consumer de-

AIRSHIPPED WINE

Here is a cargo of 223 cases of wine, grossing 8,000 lb., about to be shipped from California to New York on a twin-motored Conestoga plane of the National Skyway Freight Corp. The wine was delivered in New York 24 hours after the takeoff from Fresno, Calif.

RESEARCH MIXER

This specially constructed miniature mixing unit, operated by Dr. Stanley M. Jackson, director of nutritional research, and an assistant, is used in the Loose-Wiles Biscuit Co's. biochemical laboratory for experimentation with doughs. The mixer is water-jacketed so that the temperature of the dough can be controlled.

mand. Under the wartime curbs on the operation of fundamental economic principles, the 1945 production of butter was reported to be only approximately 66 percent of its prewar tonnage. This decrease was experienced in spite of the heavy increase in milk supply during the war period. The supply of milk during 1946 is predicted to be two to three percent less than in 1945.

To prevent a too rigorous shift in market conditions and yet permit return of the dairy industry to a free supply-and-demand market basis, a price support program was recommended. The objective is to promote maximum consumption of dairy products and to discourage accumulation of a surplus by government agencies.

The thinking is that such a program will not disturb normal business activities and would permit the government to keep its pledge to support the prices of agricultural commodities for a period of two calendar years following the end of the war.

Reestablishment of a standard grade for 90-score on market butter also was resolved in the interest of regaining market outlets lost to substitutes during the war period. The extent of this market, to be regained, was estimated in terms of 500,000,000 lb. of butter.

The improvement in butter quality is being sought by the establishment of a better integrated quality control program. To that end the National Cream Quality Program established several years ago was merged with the American Butter Institute by a unanmious vote. Factors in a successful quality-control program were cited by Prof. R. B. Stoltz of Ohio State University to be:

1. Buying of cream on a differential to encourage improved farm sanitation and cream handling practices and more frequent deliveries.
2. Limited buying days.
3. Improved coverings for cream cans and properly maintained equipment.

No loss in production is experienced in Ohio because of grading out "rejects" and "No. 2" cream.

R. C. Newton, vice-president of Swift & Co., in charge of research, emphasized the need of sanitary and housekeeping practices that will assure freedom from putrefactive bacteria, insect and vermin contamination, and non-ingredient or extraneous matter contamination. He stressed that good buildings and equipment, good housekeeping and a sanitation-minded organization are essential to good plant sanitation.

D. K. Howe, executive vice-president of Fairmont Creamery Co., Omaha, Nebr., was elected president and Arthur Good of Pickerington Creamery, Pickerington, Ohio, vice-president.

Pickle Packers Urge Use of War Containers

IMPROVED PLANT sanitation, renewed public relations activities and continued use of wartime containers were urged in the fall meeting of National Pickle Packers Association in Chicago.

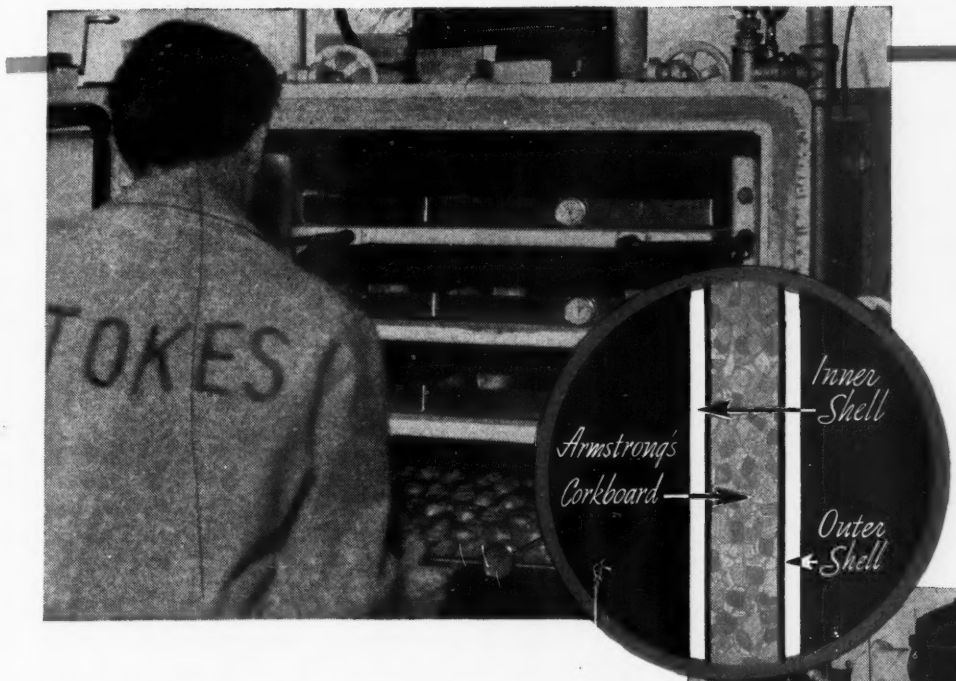
As a follow-through on the adoption in 1942 of standards of sanitation for pickle salting stations, appointment of a committee to draft regulations for sanitation of finishing and packing plants was authorized.

Resumption of the program for the educational publicizing of pickles, which was interrupted by the war, was authorized by an unanimous vote. The program is to be financed by contributions from association members based on their 1945 intake and purchases at the rate of ½ cent per bu. from manufacturers, and ⅛ cent per bu. from salters. Contributions may be voluntary from associate members.

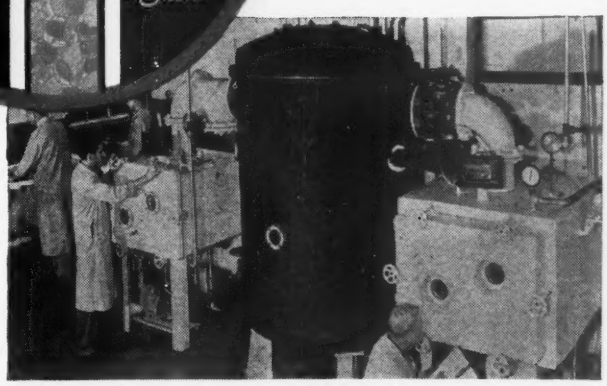
In the interests of economy and greater production of containers, the continued use of light-weight standardized containers was urged. A resumption of 1940 sizes and styles would reduce glass-container plant production by an estimated 20 percent in gross count and by an estimated 40 percent in gallonage or packaging volume. Continuation of the wartime glass containers will permit maximum production to meet increasing demand for glass containers pending expansion in glass-making plant capacity and the building of new models. An adequate supply of closures for available supply of glass containers was assured.

Inventory of salt stock on hand as of October 1, was reported to be 8,622,012 bu., compared with 8,904,435 bu. of old and new salt stocks on hand Oct. 1, 1944. The intake of the 1945 crop was reported to be 7,498,041 bu., compared with 8,423,875 bu. for 1944. Consumption of pickles from Oct. 1, 1944, to Oct. 1, 1945, was reported to be 7,780,464

This efficient insulation helps develop new Food Sublimation Process



Armstrong's Corkboard, between the inner and outer shells of the high-vacuum chambers, has helped to maintain extreme low temperatures in pilot plant development of the new freeze-drying process. At left, attendant is putting quick-frozen foods in the chamber. Below are shown the two vacuum chambers on either side of the condenser which traps moisture.



IN WORKING OUT the new Stokes low-temperature, high-vacuum process for dehydration of foods, dozens of complicated problems had to be solved. But insulation of the 50° below zero vacuum chambers was not one of them. Headaches over insulation were avoided from the beginning by using highly efficient, moisture-resistant Armstrong's Corkboard to guard sub-zero temperatures.

The research staff of the F. J. Stokes Machine Company, Philadelphia, which developed the new process through the pilot plant stage, believes that its application on a commercial scale can be expected in the near future. And Armstrong's Corkboard, which helped to hold the low temperatures in the pilot plant, will be equally effective on a regular production basis.

If you are working with any process involving refrigeration, you are invited to talk over your problems with Armstrong engineers. Their wide experience with insulations for extremes of temperature is at your service without obligation. For full information, write today to Armstrong Cork Company, Building Materials Div., 4201 Concord Street, Lancaster, Penna.

ARMSTRONG'S INDUSTRIAL INSULATION

Complete Contract Service For All Temperatures

From 300° Below Zero

To 2600° Fahrenheit

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SMALLEST
OPENING
AUDUBON
Metalwove Cord Weave was especially designed to provide the smallest possible opening obtainable in any flexible wire belt. Openings are considerably smaller than the diameter of the wire used in the weave of the belt. The closeness of the weave provides a very smooth conveying surface, especially adaptable and desirable for continuous baking equipment. Extremely high, flexible, flanged retaining edges are possible on this non-stretching, non-contracting, true running traction driven belt. Our engineers will help you select the correct specification of Cord of other Metalwove Belts, for every application in your plant. Catalog on request.
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bu., compared with 6,592,109 bu. for the preceding year.

Purchases of pickles for the Army, Navy, and Marines during 1945 was announced to be 11,656,891 gal., compared with 5,002,366 gal. during 1944. During 1945, War Food Administration purchased an additional 1,500,000 gal.

1946 annual meeting of the association is to be held February 6 at the Breakers Hotel, Atlantic City, N. J. Hotel room reservations are to be made only through the association secretary, Edward T. Miller, 233 North East Ave., Oak Park, Ill.

German Food Plants Found To Be Spotless

THE flour mills of Germany were magnificent, according to George T. Carlin, of Swift & Co.'s research laboratories, who described a recent three and a half months' tour of that country to the midwest section of the American Association of Cereal Chemists. The mills were spotlessly clean, he said, with polished floors and not a particle of flour dust anywhere.

This was true of practically all of the food industries, Mr. Carlin continued. Packing plants were tile-walled with stainless steel equipment and chrome-plated fittings. When inquiry was made as to how these plants were kept in such excellent condition, it was stated that all the employees were craftsmen and were responsible for the particular area in which they worked.

Refrigerating Engineers Talk of Food and Flavor

FOODS and flavors held equal place with engineering technicalities at the annual meeting of the American Society of Refrigerating Engineers in New York, December 10 to 12.

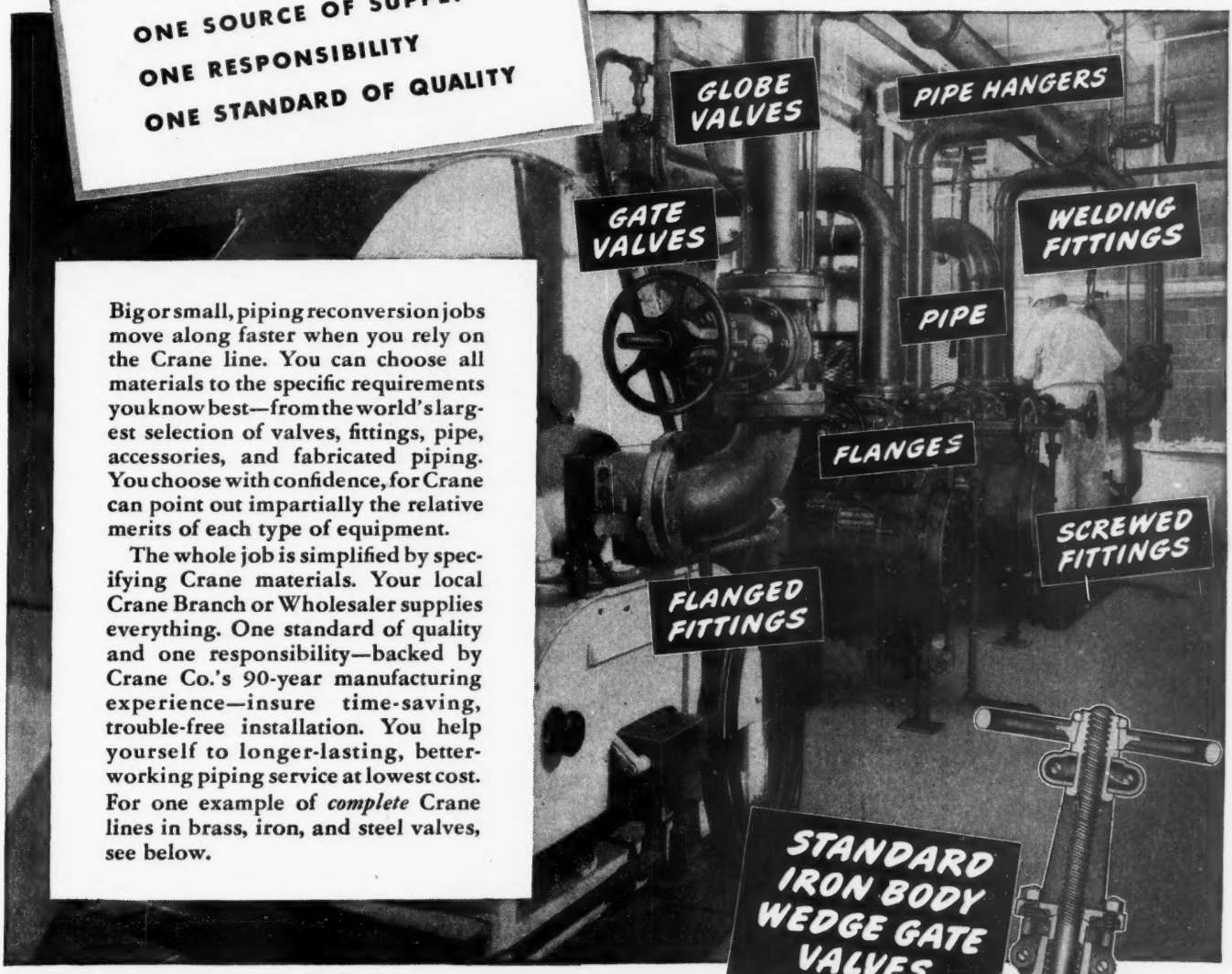
C. F. Evers stated that, in his experience, most quick-frozen cooked foods prepared under normal sanitary plant conditions give lower bacterial counts than the average of corresponding fresh-frozen produce. But precooked foods are excellent media for bacterial growth, once contamination has taken place. Plate counts for products containing fish and shellfish, for instance, have indicated that they could easily become trouble makers. The problem of preventing contamination in these foods is a serious one, relating directly to public health.

Both hand and mechanical handling methods for fruits and vegetables must be reevaluated, according

Converting Piping Systems?
Call CRANE for <u>All</u> Materials

ONE SOURCE OF SUPPLY
ONE RESPONSIBILITY
ONE STANDARD OF QUALITY

Filtering and vacuum pump system in penicillin process



Big or small, piping reconversion jobs move along faster when you rely on the Crane line. You can choose all materials to the specific requirements you know best—from the world's largest selection of valves, fittings, pipe, accessories, and fabricated piping. You choose with confidence, for Crane can point out impartially the relative merits of each type of equipment.

The whole job is simplified by specifying Crane materials. Your local Crane Branch or Wholesaler supplies everything. One standard of quality and one responsibility—backed by Crane Co.'s 90-year manufacturing experience—insure time-saving, trouble-free installation. You help yourself to longer-lasting, better-working piping service at lowest cost. For one example of *complete* Crane lines in brass, iron, and steel valves, see below.

SERVICE RECOMMENDATIONS: **Crane Standard Iron Body Wedge Gate Valves** are suited for many services in process and power lines at all working pressures up to 125 pounds steam. Brass-trimmed valves are recommended for steam, water or oil lines; all-iron valves for oil, gas or fluids that corrode brass but not iron. Made in O.S.& Y. and Non-Rising Stem patterns. See page 101 of your Crane Catalog.

Working Pressures

Size of Valve	Screwed or Flanged End Valves		Hub End Valves
	Saturated Steam	Cold Water, Oil or Gas, Non-Shock	Cold Water or Gas Non-Shock
2 to 12 in.	125 pounds	200 pounds	200 pounds
14 and 16 in.	125 pounds	150 pounds	150 pounds
18 to 24 in.	*	150 pounds	150 pounds

*For steam lines larger than 16-in., Crane 150-Pound Cast Steel Gate Valves are recommended. (For sizes under 2-in., use Crane Clamp Gate Valves.)

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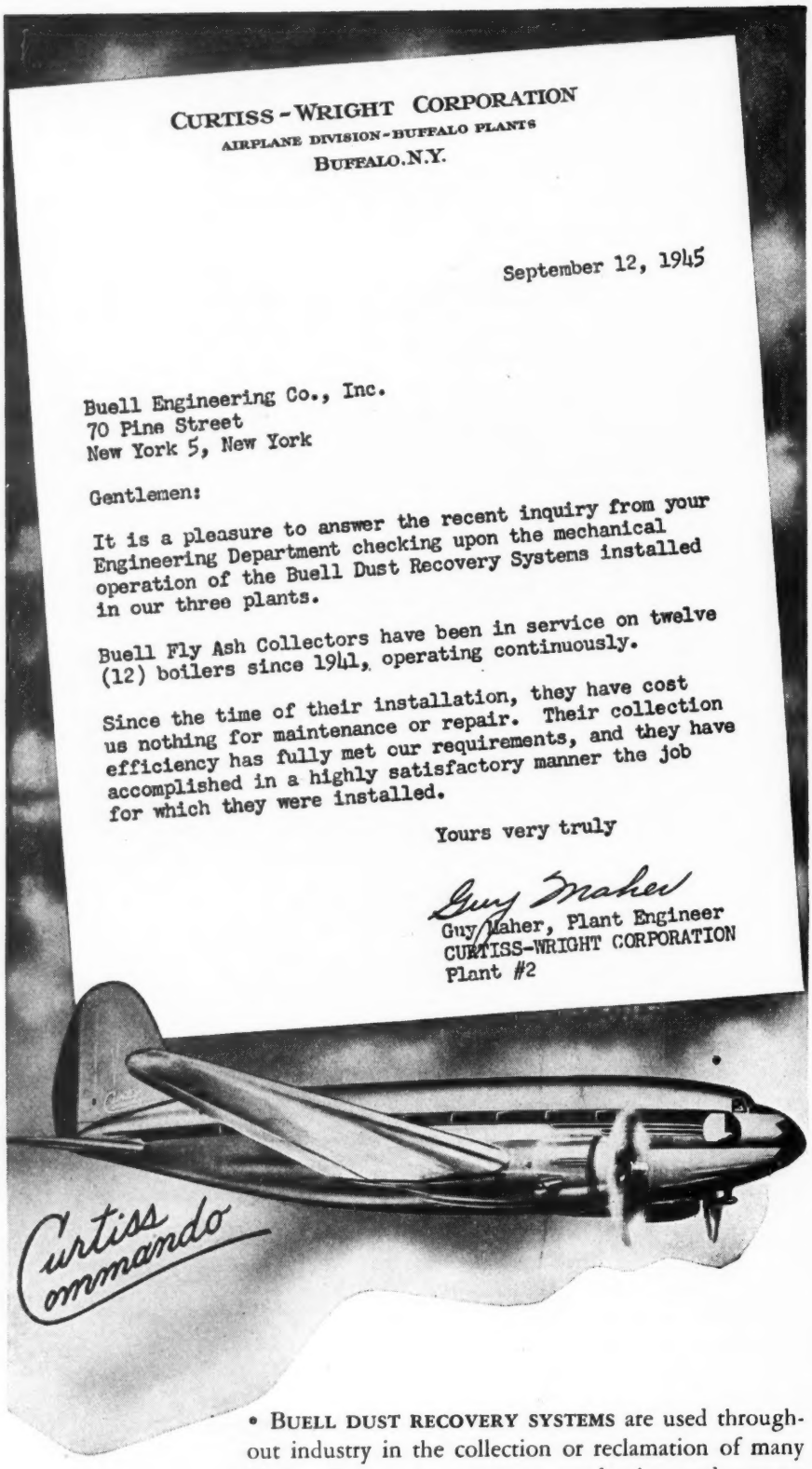
PLUMBING • HEATING • PUMPS


CURTISS-WRIGHT CORPORATION
AIRPLANE DIVISION-BUFFALO PLANTS
BUFFALO, N.Y.
September 12, 1945
Buell Engineering Co., Inc.
70 Pine Street
New York 5, New York
Gentlemen:
It is a pleasure to answer the recent inquiry from your Engineering Department checking upon the mechanical operation of the Buell Dust Recovery Systems installed in our three plants.
Buell Fly Ash Collectors have been in service on twelve (12) boilers since 1941, operating continuously.
Since the time of their installation, they have cost us nothing for maintenance or repair. Their collection efficiency has fully met our requirements, and they have accomplished in a highly satisfactory manner the job for which they were installed.
Yours very truly
Guy Maher
Guy Maher, Plant Engineer
CURTISS-WRIGHT CORPORATION
Plant #2
Curtiss Commando

• BUELL DUST RECOVERY SYSTEMS are used throughout industry in the collection or reclamation of many kinds of dust, in numerous production and process operations. Hundreds of satisfied industrial users will attest to Buell's—"High Efficiency, Low Maintenance, Long Life."

Write for Buell's new, revised book "The Buell {van Tongeren} System of Industrial Dust Recovery" now in its fourth printing.

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DESIGNED TO DO A JOB, NOT JUST TO MEET A "SPEC"

to H. C. Diehl. Whenever a tender or perishable product is subjected to shock, the impact may stimulate respiratory activity and deterioration. Integration into the processing cycle of field cooling or icing may avoid some of the trouble, and it should be done, but it is not a cure-all. Genetic development of varieties resistant to this type of damage is also being undertaken.

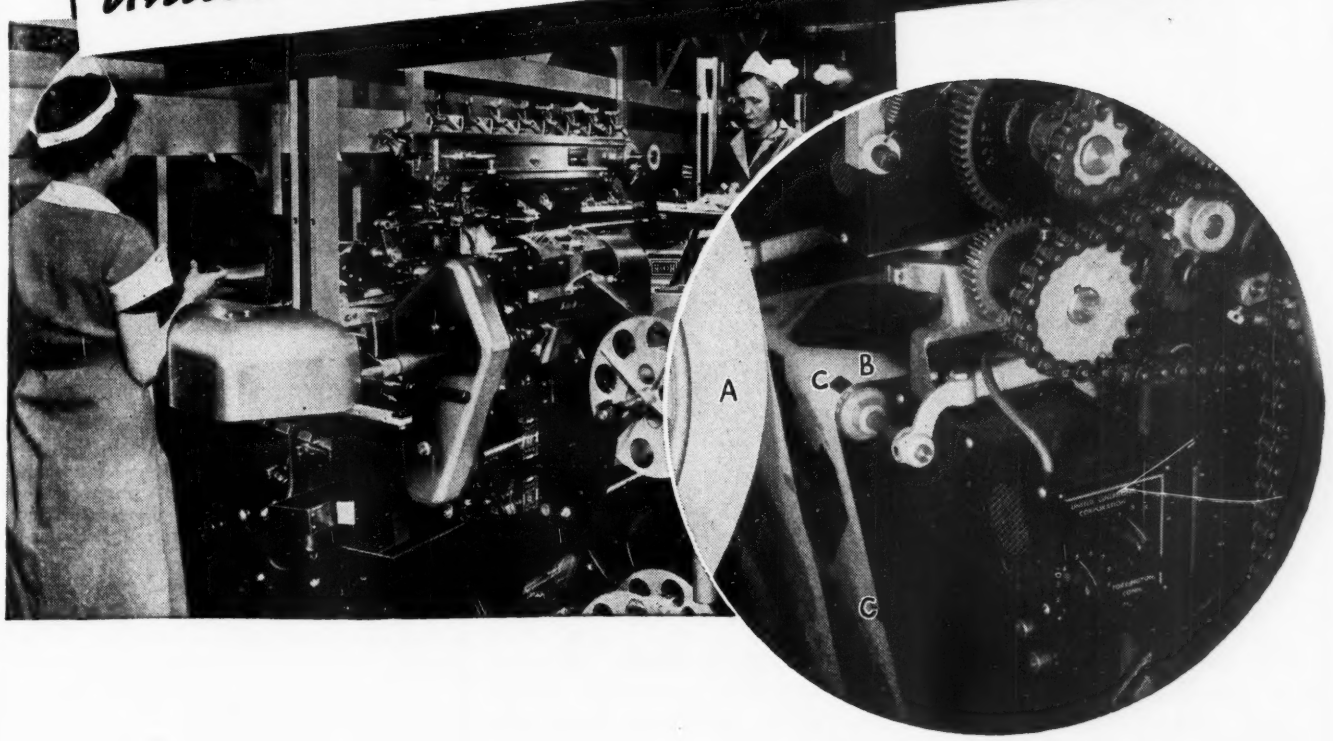
Odor control, discussed by F. H. Munkelt, may be achieved by several recognized means. The most familiar is dilution with odor-free air—ordinary ventilation. Adsorption systems, when used to decontaminate air in which odor is generating, operate by dilution. Alkalization of mixtures that give off acid vapors, chemical combination taking place in the gaseous phase, electrostatic precipitation of particles which are odor carriers, olfactory narcosis, reodoration and the washing out of soluble gases, any or all may be effective in some cases. Destruction of microorganisms which are a source of unpleasant odors, that is, sanitation or antisepsis, is most essential.

In a series of practical tests on control of extraneous odor in refrigerated food storage, C. R. Gross and R. M. Smock found activated carbon successful. They used pine chips, representing new boxes, in apple storage. The level of residual odor increases with the relative humidity, the relationship being much sharper than that between temperature and residual odor within the temperature range tested. With low humidity, ozone decreases the general odor level, but not as satisfactorily as activated carbon, especially when the latter is brominated. Ozone loses effectiveness at higher relative humidities. The experimental humidities were unfortunately lower than those common in apple storage, but the trend is clearly marked.

High Canned Output Hurdles Added Costs

AVERAGE hourly earnings in the canning and preserving industry increased from an average of about 52 cents an hour in 1941 to about 80 cents an hour in 1945, according to a statement made recently by Carlos Campbell, secretary of the National Canners Association. This represented about a 60 percent increase, he said, while prices paid by canners to growers increased about 75 to 80 percent during that period. While these increases were being made, he pointed out, canned food prices were permitted to rise only about 20 percent. "In fact," he said, "the retail

Wrapping Candy Quickly and Cleanly with WRAP-O-MATICS *Equipped with United Cinephone Electronic Controls*



The quantity production of candy bars requires quick secure wrapping with the label design perfectly centered. The Lynch Manufacturing Corporation of Defiance, Ohio has achieved these desirable results on the Wrap-O-Matic machine, pictured above. The wrappers are web-fed from a roll (A) into the machine at (B). The electric eye markings (C) register under the photo electric cell of the United Cinephone Dual Scanner registration control and actuate the cutting and wrapping mechanism with split-hair accuracy.

This is one of the many practical applications of these United Cinephone Electronic Controls to modern production needs . . .

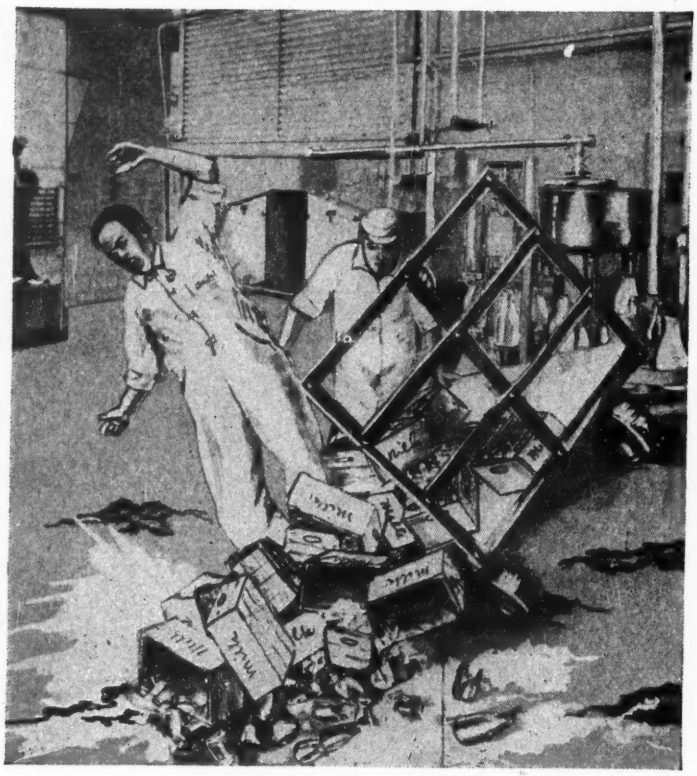
OTHER APPLICATIONS of United Cinephone Electronic Controls are almost without limit. If you have a problem of measuring, gauging, counting, sorting, heating, or some other operation in your plant, which is costly and unreliable, you will want to investigate the possibility of solving the problem ELECTRONICALLY. That's where our extensive experience and facilities in Electronic design, engineering, and manufacturing can be of invaluable help. Your inquiry will be welcome.

Electronic fields we cover include:
1. Industrial Controls
2. Aircraft Communications
3. Laboratory Test Equipment
4. Radio and Audio Equipment

UNITED CINEPHONE CORPORATION

27 NEW LITCHFIELD STREET — TORRINGTON, CONNECTICUT

This COULD *Happen to* YOU



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if you have smooth, hard and tough serviceable floors.

The easiest way for you to get such floors, trucking aisles and platforms, is to repair or completely resurface them with STONHARD RESURFACER.

This durable material is extra tough, shock-proof and fire-resistant. It is built to withstand the heaviest trucking and traffic. No cutting or ripping up of the old surface is necessary when making repairs or resurfacing with STONHARD RESURFACER.

Easily applied by unskilled labor over concrete, wood, brick or composition, STONHARD RESURFACER allows areas repaired or resurfaced to be used in 36 hours or less.

STONHARD RESURFACER is sold on a "Satisfaction or No Charge" basis. Send the coupon below for a trial drum or more information.

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888 Terminal Commerce Bldg., Philadelphia 8, Pa.

☐ Send us a trial drum of STONHARD RESURFACER.

☐ Send us more information on your trial offer.

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Building Maintenance Materials • Since 1922

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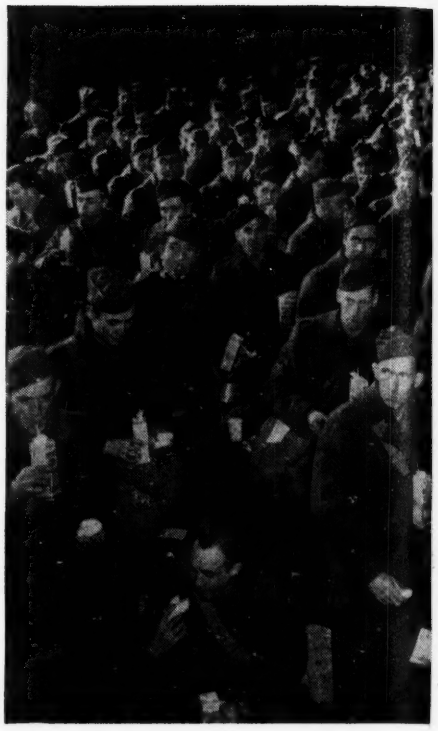

FIRST "MEAL" AT HOME

Those paper milk containers do have uses other than better stacking in refrigerators. This is part of the 11,360 troops returning on the Queen Mary just after debarking in New York, enjoying their first home-consumed food.

prices of many canned foods, in 1945, were not much above prices paid by the consumer in 1941."

The industry overcame this disparity through ingenuity in management and the great demand for canned foods during the war, permitting canners to operate at full capacity and which reduced sales efforts to a minimum.

•

Food Processors Get Final Flag Awards

FINAL AWARDS under the U. S. Department of Agriculture's program to recognize exceptional wartime achievement in food processing were announced today by the USDA. At the last meeting of the Achievement Award Board, 12 food processing plants were granted "A" Award, signifying one year of outstanding wartime service, and 25 firms were awarded the "Star" Award for a second year of distinguished production.

These bring the total number of "A" Awards granted since the beginning of the program in September 1943 to 465, and the total number of "Star" Awards to 120. All nominations approved at the final meeting were submitted prior to September 15, the closing date for the program.

CAN GLASS FREEZE *but*

MAKE IT IN MACON

The huge food market within quick shipping distance of Macon, a demand which the rising Southern income has multiplied in recent years, cries for quick-action marketing. And Macon is ready with the crops and all other needs.

We are ready for you to move in and pack.

The list to the right shows the crops on which we will assure you contracts before you move in. The area is eager for new industry, and ready to offer every possible cooperation. The City and State authorities are cooperative. The climate is right. Living conditions are right. And Macon workers are skilled, but unspoiled by war wages. They are almost 100% anglo-saxon, with a real will to do a good job for you.

Macon knows food processing. It is an industry that succeeds here, makes a profit and grows. That has been demonstrated. When we invite you, it is because we know you can succeed, too. And Macon wants only successful operations. So you can count on what we tell you.

Contracts Assured on These Crops

Peaches
Pecans
Watermelons
Tomatoes
Pimientos
Green Peppers
Sweet Potatoes
Irish Potatoes
English Peas
Field Peas
Beans
Carrots
Beets
Collards
Turnip Greens
Radishes
Spinach
Cucumbers
Onions
Egg Plant
Rutabagas
Okra
Strawberries
Sweet Corn

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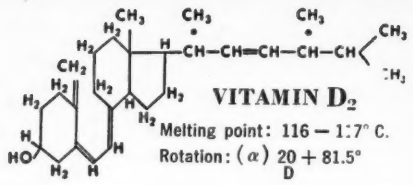
Winthrop ANNOUNCES New Low Prices on—

PURE CRYSTALLINE Vitamin D_2

★(CALCIFEROL)



VITAMIN D_2

Melting point: 116 — 117° C.

Rotation: $(\alpha)\ ^{20}_{D} + 81.5°$

Write For Details and New Price Schedule

Winthrop's synthetic vitamin D_2 (Calciferol) is free from lumisterol, toxisterol, suprasterol, and other by-products of irradiation. It never varies in antirachitic potency.

OTHER WINTHROP PURE SYNTHETIC VITAMINS:

- **TRIDEE**—Winthrop's Brand of vitamin D_3 in Corn Oil
- **VITAMIN B_1** (Thiamine Hydrochloride)
- **VITAMIN B_2** (Riboflavin)
- **NIACINAMIDE**
- **VITAMIN B_6** (Pyridoxine Hydrochloride)
- **CALCIUM PANTOTHENATE**
- **VITAMIN C** (Ascorbic Acid)
- **d-ISO-ASCORBIC ACID . . .**
- **AMINO-ACIDS**

Valine	Glutamic Acid
Cystine	Tryptophane
Tyrosine	Phenylalanine
Leucine	Methionine

- **"B-E-T-S"**—Winthrop's Brand of Bread-Enrichment Tablets
- **"VEXTRAM"**—Winthrop's Brand of Flour-Enrichment Mixture

POTENCIES AND PACKINGS:

Crystalline Form in vials of one, five, and ten grams.

Solution in Corn Oil: 1,000,000 U.S.P. Units per gram* packed as follows:

400 Standard Units	2,500 Standard Units
1,000 Standard Units	50,000 Standard Units

Also Solution in Corn Oil: 400,000 U.S.P. Units per gram packed as follows:

250 Standard Units	1,000 Standard Units
500 Standard Units	20,000 Standard Units

*Standard Unit=1,000,000 U. S. P. Units

WINTHROP

For prices and information address

Special Markets Division

WINTHROP CHEMICAL COMPANY, INC.

170 Varick Street, New York 13, N. Y.

☆ Sole Manufacturer under U.S. Patent 1,902,785 granted to Winthrop Chemical Company, Inc.

"A" Awards were granted to:

Aron Canning Company, Stockton, F. W. Boltz Corp., Los Angeles, Gerber Products Co., Oakland, Universal Marketing Co., Inc., Riverside, Verda Poultry Co., Roscoe, Calif.; Libby, McNeill & Libby, Blue Island, Ill.; Kentucky-Tennessee Food Coop., Hopkinsville, Ky.; Belfast Packing Co., Belfast, Me.; Pet Milk Company plants in Adrian and Wayland, Libby, McNeill & Libby, Sheridan, Mich.; Kentucky-Tennessee Food Coop., Springfield, Tenn.

"Star" Awards announced today were granted to:

Boaz Creamery, Boaz, Ala.; S & W Fine Foods, Inc., Redwood City, Calif.; Libby, McNeill & Libby, Manzanola, Colo.; Libby, McNeill & Libby plants in Wyoming and Houston, Del.; Adams Packing Ass'n, Auburndale, Havana Canning Co., Havana, Bordo Products Co., Inc., Winter Haven, The William P. McDonald Corp., Auburndale, Pasco Packing Ass'n, Dade City, Dr. P. Philips Canning Co., Inc., Orlando Plymouth Citrus Growers Ass'n, Plymouth, Polk Packing Ass'n, Winter Haven, The Hills Bros. Co., Bartow, Floridagold Citrus Corp., Lake Alfred, Fla.; The R. J. Peacock Canning Company plant in Eastport and two in Lubec, Me.; Deerfoot Farms, Southborough, Mass.; Cudahy Packing Co., New Ulm, Minn.; G. L. F. Waterloo Farm Products Coop., Inc., Waterloo; The Borden Co., Bainbridge, N. Y.; G. L. F. Columbia Farm Products Coop., Inc., Bloomsburg, Pa.; Tri-State Milling Co., Rapid City, S. D.; Libby, McNeill & Libby, Kent, Wash.

The Achievement Award Program was inaugurated to give public recognition to the management and employees of food processing plants which led their industry in war production and cooperation with wartime supply programs. To win either or both the awards, plants had to meet high requirements regarding quantity and quality of production; comply with applicable Federal regulations and statutes; demonstrate ingenuity and cooperation with the government in developing new products and packaging suited to special wartime needs; maintain satisfactory employer-employee relations, with minimum work stoppages and absenteeism; provide superior safety and health protection for plant personnel; and cooperate with producers by maintaining support prices or better.

Even Beneficial Food May Harm Total Diet

A DRASTIC change in the diet may be harmful even when it adds beneficial food, Dr. C. A. Elvehjem, professor of biochemistry at the University of Wisconsin, warned in a report to the Chicago section of the American Chemical Society.

Biochemists have found, Dr. Elvehjem explained, that it is not safe to recommend a new food for a specific purpose, unless they first determine its effect on total nutrition.

"We have much still to learn about nutrition," he declared, "and we may suggest programs that are deleterious to optimum health, rather than beneficial, if we use too extensively the fragmentary knowledge that is now available."

. . . And that's a sound formula for more repeat sales. For easy access to contents encourages more frequent use of the product. Anchor Amerseal Caps were developed with feminine fingers in mind. They remove and reseal with an easy, simple quarter-turn.

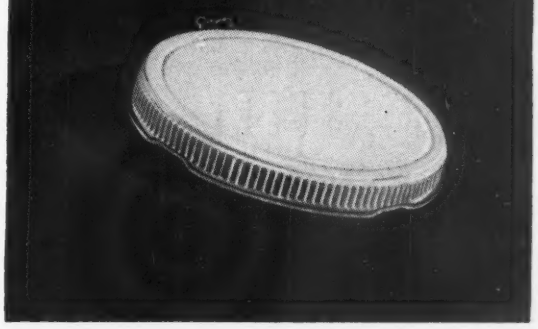
Not only are Anchor Amerseals the easiest closures to remove; they reseal as effectively the hundredth time as the first. Anchor Amerseal Caps never stick, gum or freeze to the container finish because they employ lugs rather than threads to effect the seal and these make contact only at the points where each engages the underside of the glass threads.

Regardless of the nature of your products, you can depend on Anchor Amerseals to provide perfect airtight, leakproof seals and to create goodwill and repeat sales for the products entrusted to them.

Tune in ANCHOR HOCKING'S HOBBY LOBBY CBS NETWORK . . . THURS. EVE.

Anchor
CONTAINERS AND CAPS

PRODUCTS OF
ANCHOR HOCKING GLASS CORPORATION
LANCASTER, OHIO



a PLANT MANAGER says:

"...We like Inland Steel Containers

... because they are uniform in size and weight and lend themselves to handling on ordinary conveying equipment. They are easily filled and closed air tight. Substitute containers we have been forced to use under war conditions have taught us to appreciate the outstanding advantages of the steel container."

No. 5538 STANDARD SHIPPING BARREL

No. 584 LUG COVER PAIL

No. 514X LEVER LOCKING RING PAIL

No. 584R SWIVEL-SPOUT POR-PAIL

No. 594Q CLOSED TOP PAIL

- NO LEAKAGE
- NO SPOILAGE
- NO CONTAMINATION

INLAND STEEL CONTAINER CO.

Container Specialists

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For example, he said, most workers in this field regard a high level of protein in the diet as desirable, but it has recently been discovered that a deficiency in Vitamin B_6, or pyridoxine, develops faster on high protein diets. A high level of fat may tend to reduce tooth decay, he continued, but it may also tend to reduce the necessary synthesis of vitamins in the intestinal tract.

Roaches Abolished

TESTS in the kitchens of the Interior Department Building, Washington, have demonstrated that a roach "abolisher," using a new principle, makes it possible to isolate any food plant or warehouse against infestation, according to Jay D. Miller, president of Jaygol Products Corporation, Brooklyn, N. Y.

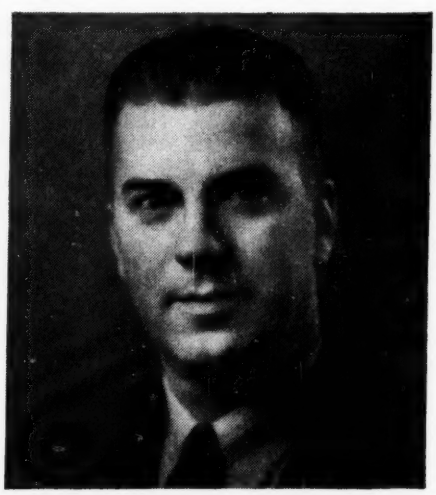
The results obtained in the tests were so impressive that Government Services, Inc., which operates 104 cafeterias in Washington's government buildings, has ordered nearly five tons of his product, Miller says.

Staff Changes Made On Food Industries

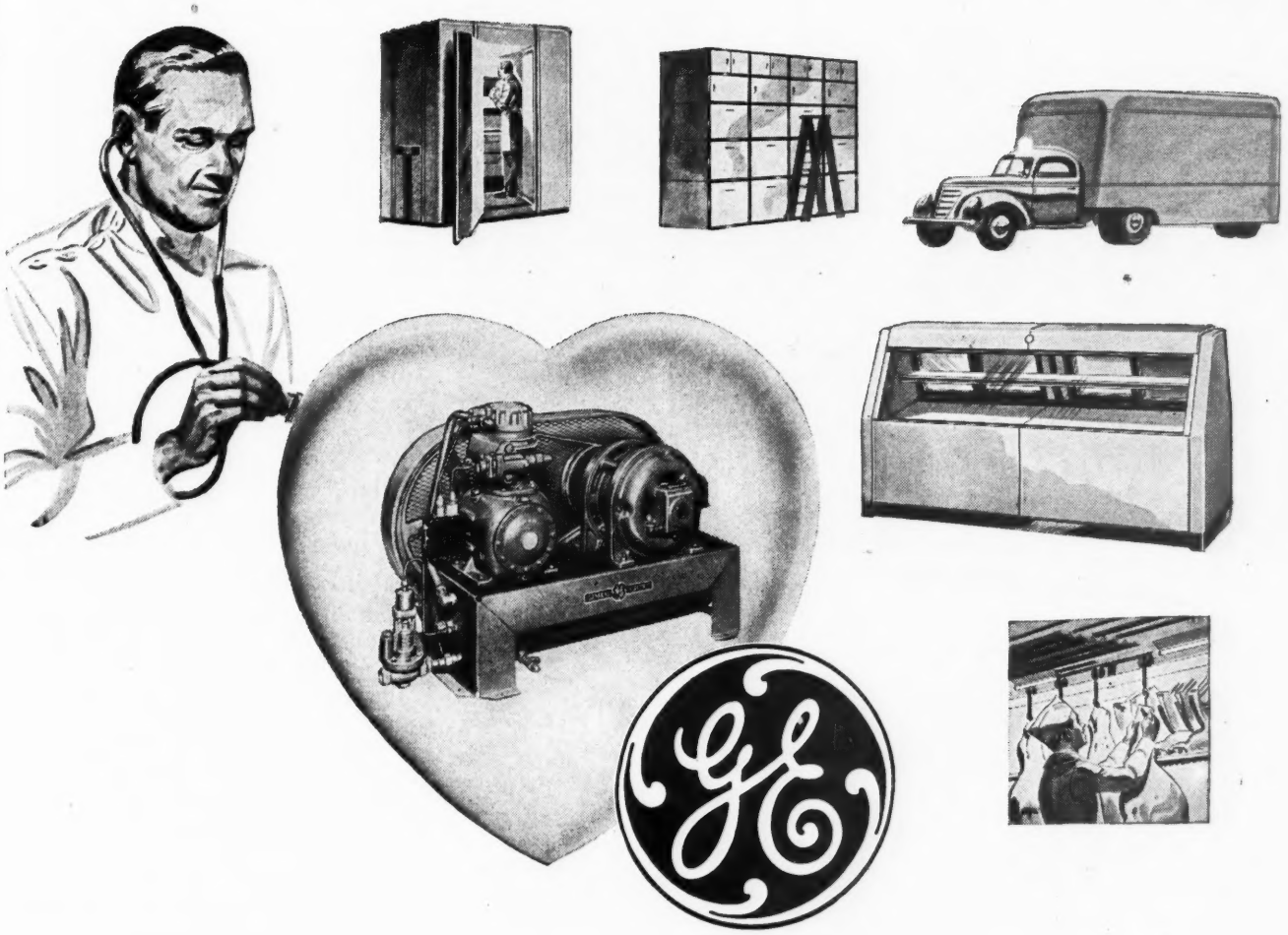
SEVERAL changes on the FOOD INDUSTRIES editorial staff have been announced, effective January 1, when C. R. Havighorst, of the San Francisco office, and L. Charles Mazzola, of the New York staff, are promoted to associate editors.

The publication also announces, with regret, the resignation of Frank K. Lawler, managing editor since 1939, who leaves to become production editor of Business Week.

Arthur V. Gemmill, a chemical engineer from the University of Illinois, who has had 14 years experience in the food industry with the Castle and Town Talk ice cream companies, was added to the staff in December as an assistant editor.



ARTHUR V. GEMMILL



For long, efficient life... a sturdy HEART

GIVE your refrigeration system a heart that will last for years of trouble-free service . . . a G-E Condensing Unit.

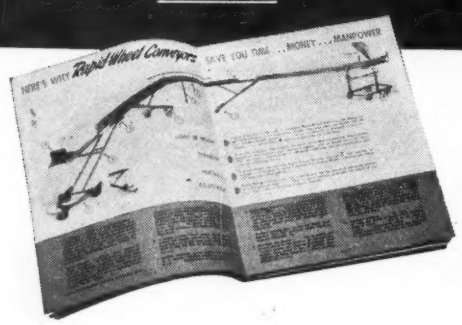
There's a G-E Unit for every refrigerating need . . . in sizes from ⅛ to 125 hp. For food-freezer units, for display counters, for walk-ins, for large refrigerating plants, refrigerating engineers are specifying G. E. because:

1. **The G-E Condensing Unit has been *factory-tested and field-tested* for a long life of service under all conditions.**
2. **The G-E Unit does a cooling job surpassing that of other units requiring much greater floor space. Cuts operating costs and space costs, too!**
3. **Compressor, condenser, motor and motor controls are built and *coordinated* by General Electric to give high capacity with low power consumption.**

Discuss your refrigeration problems with your nearest G-E dealer. You'll find his name listed in your Classified Directory under "Refrigeration Equipment." *General Electric Company, Air Conditioning Department, Section 6891, Bloomfield, New Jersey.*

GENERAL ELECTRIC

It's wise to CONVEYORIZE



Send for your FREE CATALOG

This catalog contains information about the construction features and uses of Rapid Wheel Gravity Conveyors, together with complete specifications and data on standard accessories manufactured for use with the conveyors. The catalog also shows on-the-spot photos of Rapid Wheel Gravity Conveyors in action on all types of conveying jobs.

Operating with the smooth gravity principle, Rapid Wheel Conveyors speed and ease the handling of goods wherever the need arises. Portable and easily handled, they may be set up or dismantled in a matter of minutes. They are manufactured in standard 5-foot and 10-foot lengths and in widths of 12" and 18". (Other lengths are manufactured upon request.)

Send for your copy of the new, illustrated catalog today. It shows how you can save time, money and manpower on your package handling operations . . . IT'S WISE TO CONVEYORIZE!

Please send the new Rapid Wheel Conveyor Catalog without charge or obligation to:

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Sales Division—361 Peoples National Bank Bldg., Grand Rapids 2, Michigan

N. Y. U. Will Teach Research Management

LAST YEAR, the graduate division, College of Engineering, New York University, offered a graduate course on the management of research and development. This course was set up in order to take care of the rising needs of industry for men who have had some training in this field. As the need is greater now than ever before, it has been decided to repeat the course beginning on Thursday, January 31. The registration period for the course is January 21 to January 24, inclusive.

The lectures in the course will be given by a distinguished group of directors from leading companies, and will cover a wide range of topics that are of primary importance to industrial research.

Whole-wheat Claimed Superior To Enriched

WHOLE WHEAT bread was recommended as superior to enriched white bread by Dr. Agnes Fay Morgan, University of California home economist, who declared that efforts should be made to increase use of the darker bread, average consumption of which is now only 5 percent.

Whole wheat flour provides a good supply of protein and other B-vitamin complexes, as well as thiamin, niacin, and iron. With the addition of from 4 to 6 percent milk solids, riboflavin would be supplied, reinforcing the calcium content of the bread.

A Correction

IN a note to the lead editorial on page 71 of the December issue of FOOD INDUSTRIES, the statement was made that copies of U. S. patents could be obtained from the Commissioner of Patents, Raleigh, N. C. This statement was incorrect as the only place such copies can be obtained is at the U. S. Patent Office, Washington 25, D. C.

Cheese Research

THE De-Raef Corp., Kansas City, Mo., has announced the granting of $1,000 to the dairy department of the University of Missouri for a foundation fellowship, under the leadership of Professor W. H. E. Reid, of the Dairy Products Research Department of the University. The fellowship will continue over a period of years to allow the research department in dairy products at the University to keep the cheese industry abreast of modern research in cultured cheddar cheese.

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● Whenever you have a problem involving Stainless Tubing, feel free to get in touch with your nearest distributor—listed here. His facilities are there to help you get the best service possible. When you want information about 100% hydrostatically tested Carpenter Welded Stainless Tubing—get in touch with the nearest office shown here.

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Anti-Corrosive Metal Products, Inc.
Castleton 2511

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J. M. Tull Metal & Supply Co.—Walnut 3525

BALTIMORE, MARYLAND
Horace T. Potts Co.—Mulberry 8260

BEAUMONT, TEXAS
Standard Brass & Mfg. Co.—Beaumont 1129

BERKELEY, CALIFORNIA
American Rolling Mill Co. of Calif.
Ashberry 5600

BOSTON, MASSACHUSETTS
Brown-Wales Co.—Liberty 6100

BUFFALO, NEW YORK
Service Steel Co.—Delaware 8900

CAMBRIDGE, MASSACHUSETTS
Industrial Steels, Inc.—Trowbridge 7000

CHICAGO, ILLINOIS
Amory & Company—Superior 3625
Cherry-Burrell Corp.—Dearborn 7900
C. A. Roberts Co.—Haymarket 6330
Branch Office of The Carpenter Steel Company
Welded Alloy Tube Division—Central 3506

CINCINNATI, OHIO
Service Steel Co.—Wabash 2750

CLEVELAND, OHIO
Cleveland Tool & Supply Co.—Cherry 2510

DETROIT, MICHIGAN
Service Steel Co.—Randolph 9350

ELIZABETH, NEW JERSEY
Schnitzer Alloy Products Co.—Elizabeth 2-2090

EUGENE, OREGON
Electric Steel Foundry Co.—5012

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A. P. Wright—Fairfax 0268
Standard Brass & Mfg. Co.—Preston 1123

INDIANAPOLIS, INDIANA
C. A. Roberts Co.—Belmont 0600

KINGSPORT, TENNESSEE
Slip-Not Belting Co.—Kingsport 5128

KNOXVILLE, TENNESSEE
Slip-Not Belting Co.—Knoxville 3-3811

LOS ANGELES, CALIFORNIA
American Rolling Mill Co. of Calif.
Prospect 8365
Electric Steel Foundry Co.—Lucas 7251

NEW YORK, NEW YORK
Peter A. Frasse & Co., Inc.—Walker 5-2200

PHILADELPHIA, PENNSYLVANIA
Horace T. Potts Co.—Regent 7450

PITTSBURGH, PENNSYLVANIA
Chandler-Boyd Co.—Hemlock 1860

PORT ARTHUR, TEXAS
Standard Brass & Mfg. Co.—Port Arthur 9377

PORTLAND, OREGON
Electric Steel Foundry Co.—Atwater 2141

ST. LOUIS, MISSOURI
C. A. Roberts Co.—Chestnut 7070
Branch Office of The Carpenter Steel Company
Welded Alloy Tube Division—Franklin 0905

SAN FRANCISCO, CALIFORNIA
Electric Steel Foundry Co.—Exbrook 5325

SEATTLE, WASHINGTON
Electric Steel Foundry Co.—Elliott 4161

TORONTO, CANADA
Standard Tube Co., Ltd.—Lloydbrook 7265

WOODSTOCK, CANADA
Standard Tube Co., Ltd.—Woodstock 1975

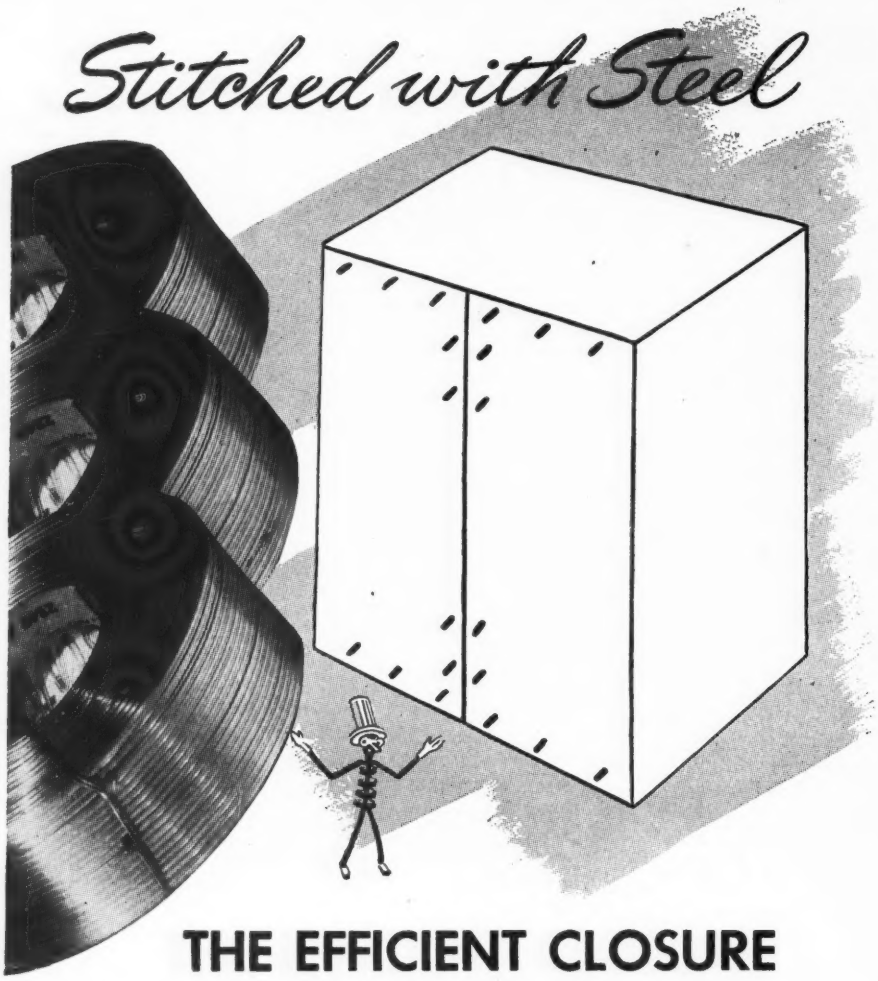
ASK FOR THIS NEW SLIDE CHART OF TECHNICAL DATA

In convenient form, this slide chart gives you useful information on: • Mass Velocity Constants (V_m) • Velocity Constants (V_1) • Cross Sectional Areas of Tubes • Sq. Ft. Internal Surface per Lineal Foot of Tube • Physical Properties of Stainless Tubing. A note on your company letterhead will start your Stainless Tubing Slide Chart on its way. Write for your copy today.

THE CARPENTER STEEL COMPANY
Welded Alloy Tube Division
Kenilworth, New Jersey

Carpenter
WELDED
STAINLESS TUBING

Stitched with Steel



THE EFFICIENT CLOSURE FOR SHIPPING CONTAINERS

Acme Silverstitch

Advantages of closing fiber shipping containers with Acme Silverstitch Stapling Wire and the Silverstitcher:

- closures not affected by weather
- no lost time waiting for adhesives to set
- faster—no adjustment for size of box
- dependable, stronger seal than other methods
- stitches do not obscure printed message or design on the box
- cuts cost in materials and space
- easy to operate and maintain the Silverstitcher machine

NEW YORK 17 ATLANTA **ACME STEEL COMPANY** CHICAGO 8 LOS ANGELES 11

SilverStitch SilverStitchers

PROCESSING

New Price Method May Speed Food Equipment

DURING late November OPA moved to provide a continuous flow of equipment for food processing by developing a new method for manufacturers to adjust their prices. Announcement was made the first of December that the new pricing provisions would be made effective on December 11.

Government officials do not anticipate a general advance in the price of machinery to result. The new plan really supplants the adjustment paragraphs in the price orders previously in effect. It provides hardship relief for those manufacturers who may find themselves in a loss position now that the war orders are a thing of the past.

Investigation of the early results showed that there was no rush on the part of manufacturers to take advantage of the new provisions. An average number of applications for relief was received up to Christmas time indicating that the plan was functioning as desired. Adjustments were being made to insure continuous production.

Test Adds B-Vitamins To California Wines

NEW tests, tried out in the University of California laboratories at Berkeley and Davis, have resulted in the fortification of California wines with B-vitamins that retain their stability over a long period. The California Wine Institute assisted with the experiments.

Over a period of four years, the vitamins in the wine remained stable, proving that fortification could be both economical and justifiable. B-vitamins are said to contain some degree of prevention to dermatitis symptoms, mental disorders, and digestive disorders of pellagra occasionally seen in alcoholics.

The procedure was directed by Dr. Agnes Fay Morgan, professor of home economics.

Warning Given Bakers Who Ignore Enrichment

WARNING letters, which alleged violation of the Second War Powers Act and War Food Order 1, were recently sent to seven Worcester, Mass., bakers and baking firms, citing failure to enrich white bread and rolls in the manner provided under the terms of the order.

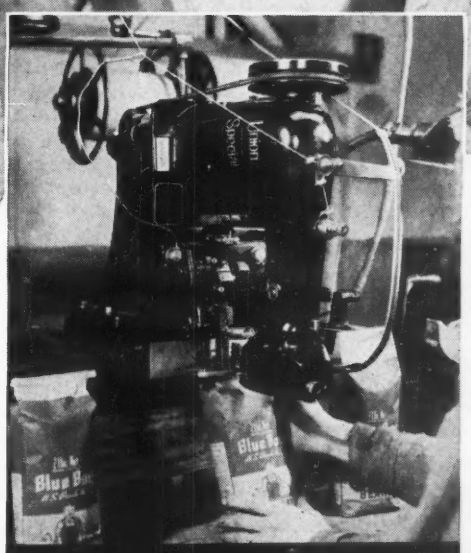
CUTS PACKAGING COSTS!

•

the Union Special DUBL-TAPE CLOSURE

. . . produced by the 60000 D Sewing Head

Here's an effective, economical way to smiles of satisfaction to the food processor, the retail distributor and the individual customer! It's *really good packaging*, characterized by the finest type of bag closure. The Union Special **DUBL-TAPE CLOSURE** is sturdy, tight, economical to produce, eye-appealing, easy to open. It is the ideal closure for small paper bags, from 1 lb. to 25 lb. size. The 60000 D sewing head, which produces this closure, applies a strip of paper tape to each side of the bag top, runs a secure stitch through the tape and trims the bag top. This is all done simply, at low cost and automatically results in a strong, firm package. Write today for details on this and other equipment for closing all sizes of paper and fabric bags. **UNION SPECIAL MACHINE COMPANY**, 450 North Franklin Street, Chicago 10, Illinois.

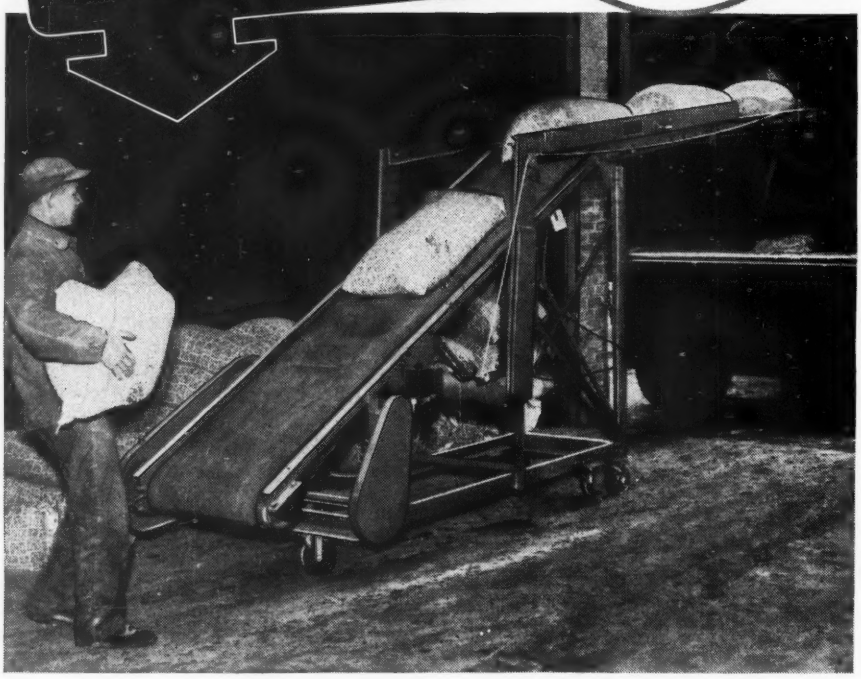


FAST—Keyed to the output of standard filling or weighing equipment.
ECONOMICAL — Uses inexpensive cotton thread and paper tape.
EASY TO OPERATE—Inexperienced help can be trained to operate the machine in a few hours. Light, easy work.
DEPENDABLE—A precision built, quality machine designed for years of service.
SEMI-AUTOMATIC OR AUTOMATIC—For use as one operator machine or as part of completely automatic installation.
VERSATILE—Style 60000 DZ sewing head makes the bound over tape closure on this range in sizes of filled bags.
ABOVE — George W. Haxton & Son closes bags of beans at 40 per minute with the Dubl-Tape Closure produced by 60000 D sewing head.

Union Special *Machine Company*

LOAD OR UNLOAD TRUCKS AND CARS

Easier-Faster-at Low Cost



with the HANDIPILER

THE HANDIPILER loads, unloads, elevates, stacks, handles cartons, cases, bags, other packages. Compact, lightweight, safe, easy to operate, flexible, it is easily wheeled into crowded corners, around the shipping platform—fine for truck loading. Adjustable boom is clear of supporting obstructions; easily extended over piles or into car or truck. Floor locks hold machine in position. Reversible carrying apron. Available in four sizes, high end adjustable up to 7½, 8½, 9½, and 10½ feet; stacks commodities as high as 12, 13, or 14 feet. Handles individual items up to 100 lbs. Motor mechanism in base frame—plug into any convenient outlet. Write for Bulletin No. FI-16

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Gravity and Power

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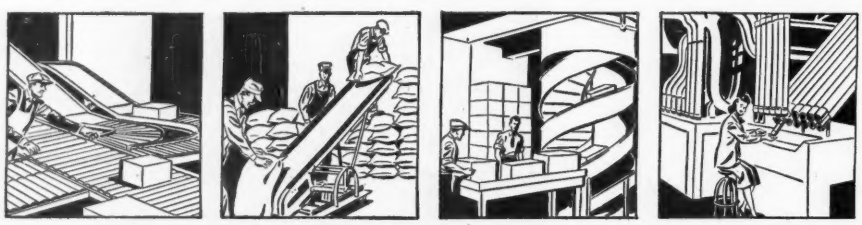
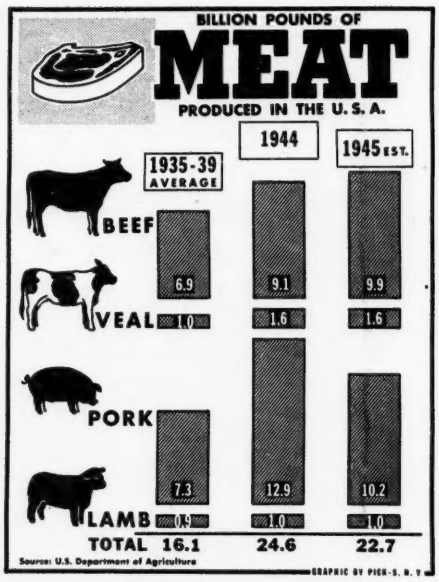


ROLLER-BELT-SLAT-PUSHBAR CONVEYORS • PORTABLE CONVEYORS AND PILERS • SPIRAL CHUTES • PNEUMATIC TUBE SYSTEMS



MEAT PRODUCTION

It is apparent from this chart that the demands of the armed forces and increased civilian consumption had a lot to do with the meat shortage during the last three years. Meat production was greatly increased even though it did not satisfy the demand.

The letters warned the bakers that if they continued to violate the provisions of Amendment 7 of the order by failing to enrich their white bread and rolls, they would be liable to severe penalties up to a maximum of one year in a federal prison or a $10,000 fine, or both.

Laboratory tests disclosed that the white bread and rolls made by the seven bakers were lacking in the vitamins and minerals required under the program established to provide bread enrichment.

These letters were issued by Leslie R. Horn, compliance officer in charge, New York Field Office, Compliance and Investigation Branch, Department of Agriculture.

New Duff's Mix Plant Goes To So. West Ohio

THE new plant of P. Duff & Sons, baking mixes, will be built in Southwestern Ohio, instead of Pittsburgh, as previously planned, if the present provisions of the parent company, American Home Foods, are carried out. H. W. Roden, president of American Home Foods, said Hamilton, Ohio, was favored because of its ready access to the raw materials used in the production of Duff's mixes.

The Duff company has been operating in Pittsburgh for 78 years, and for that reason, according to Mr. Roden, every effort was made to keep the plant in that city. However, greater efficiency, afforded by a location closer to the source of supply,

PROTECT YOUR FUTURE

IN FROZEN FOODS.....

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MUNDET
INSULATION MANUAL

INSULATE WITH CORK

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CHICAGO 21
135 West 63rd Street

CINCINNATI 2
427 West 4th Street

DALLAS 1
505 Southland Life Annex

DETROIT 26
335 West Jefferson Avenue

HOUSTON 1
Commerce and Palmer Streets

JACKSONVILLE 7, FLA.
1212 Mary Street

KANSAS CITY 7, MO.
1428 St. Louis Avenue

LOS ANGELES 31
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35 Booth Avenue, Toronto

Write us for name of our nearest representative if there is no Mundet office in your city.

You don't change insulation as you change a suit of clothes. Nor as you change from outmoded machines to something newer and better. The insulation that goes into your cold rooms, cold-holding cabinets or freezers, goes there to stay . . . and to *stay* at highest efficiency. Insulation may not be seen after it is installed, but the effect of its service sweetens or sours your profit and loss statement.

Cork insulation, properly installed, does not become obsolete. It keeps right on serving at top efficiency for as long as you are likely to need it. Because of Cork's long service to the refrigeration industry, its performance is a matter of record. It is the standard of comparison for low temperature insulation efficiency.

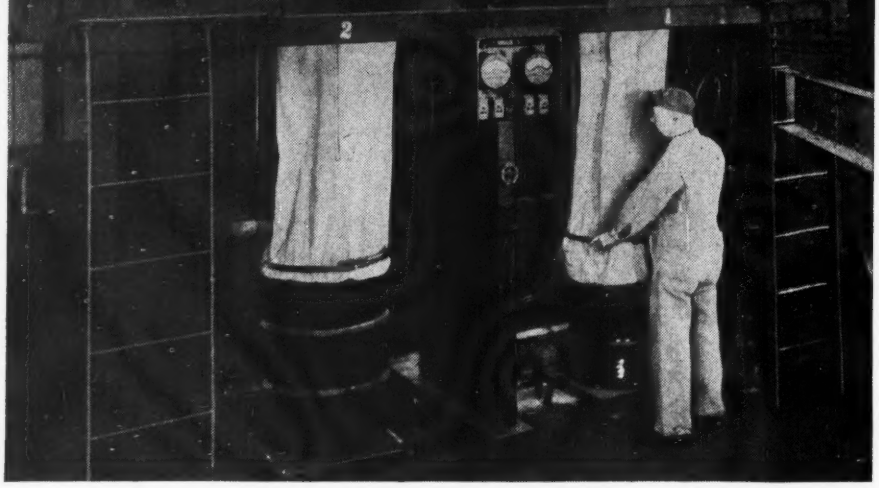
Cork offers other advantages, in addition to its well-known insulating qualities. It is structurally strong. Its compressive strength and resiliency make it an excellent construction material. Light-in-weight, corkboard is handled easily during installation. It cuts economically, and permits tight-fitting joints that give extra protection to insulated areas.

Cork maintains its shape and characteristics under varying conditions of use. Cork has no capillary attraction and so does not absorb dampness or odors. Bacterial growth, swelling and loss of insulating value due to moisture infiltration are thus avoided. Be sure you have Cork's long-lasting protection for your equipment. Let us help you plan for your future in frozen foods. Mundet Cork Corporation, Insulation Division, 65 S. 11th St., Brooklyn 11, N. Y.

MUNDET CORK INSULATION

CONSERVES LOW TEMPERATURE

CHANGE PRODUCTS
in 20 to 30 minutes
without contamination



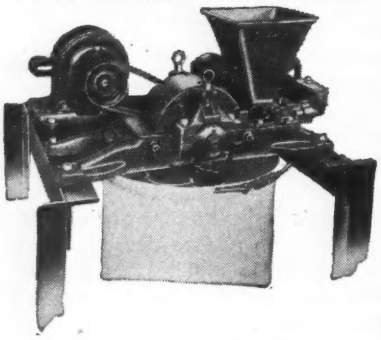
Two No. 2TH MIKRO-PULVERIZERS in a typical installation where mills are fed from large mixers on floor above and discharge directly to shipping drums.

Many MIKRO-PULVERIZER users in the food industry tell us it is regular practice to change from one product to another in 20 to 30 minutes—without the slightest contamination from the material previously handled.

Since the majority of MIKROS are operated without the use of fans, cyclones, separators and such, it is obvious the big problem of cleaning such devices with their connecting pipes, is at once eliminated.

Cleaning a MIKRO-PULVERIZER therefore, consists essentially of cleaning the mill only. Here again, the distinctive design of the MIKRO offers a tremendous advantage. For, all parts are fully and easily accessible for cleaning and inspection.

No. 2TH MIKRO PULVERIZER



This accessibility and easy cleaning plays no small part in making MIKROS a great favorite in industry. For full information as to how a MIKRO would fit into your plant operation, write for your copy of Confidential Test Grinding Data Sheet.

PULVERIZING MACHINERY COMPANY

97 CHATHAM ROAD • SUMMIT, N. J.

NOW...2 TYPES TO MEET MOST PULVERIZING NEEDS

MIKRO-PULVERIZER (FINE)
-ATOMIZER (ULTRA FINE)

Reg. U. S. Pat. Off.

dictated the new location. Mr. Roden said that it was hoped that ground would be broken in the spring for a modern food plant, similar to Clapp's Baby Food plant in Rochester, N. Y. The cost of the new plant was estimated at approximately $1,000,000, and would employ about 300 people at the outset. Mr. Roden said that the plans are subject to revision upward, as 1945 sales are twelve times those of five years ago and present forecasts indicate a 25 percent volume increase in 1946.

National Cream Joins With Butter Institute

AT a legally called Special Meeting of the subscribers to the National Cream Quality Program, at the Drake Hotel, Chicago, November 27, authority was given, by unanimous vote of those present, to merge the organization with that of the American Butter Institute.

As there will be some legal procedure to follow in carrying out these plans, it will not be effective until January 1. Upon the effective date, the assets and activities of the National Cream Quality Program will be turned over to the American Butter Institute.

When the merger is completed the American Butter Institute will carry on cream quality activities as a distinct department of that organization. It is anticipated that this plan will simplify and make more effective the butter industry's activities in cream improvement.

Plant Mergers Expand Stokely's Operations

STOKELY-VAN CAMP, INC., is increasing the total of its canning plants to 64 in 20 states, Canada, and Hawaii through merger with Columbus Foods Corp., with headquarters at Columbus, Wis.

The added plants are located at Columbus, Horicon, and Evansville, Wis.; Lawrence, Kans.; and Shelbyville, Ind. Farm land, equipment, buildings and live stock are included with the Wisconsin canning plants. All present management and personnel are being retained in their positions. The merger is expected to be completed before June.

Other mergers consummated by Stokely-Van Camp during the past 18 months are those in which it acquired the plants of Crampton Canneries, Inc., in Ohio, with controlling interests of W. R. Roach Co., in Michigan, and the plant of Gibson Canning Co., at Gibson City, Ill.

. . . and they SEE it in GLASS!

THE more your customer sees the product she has bought, the more she uses it . . . and the *quicker* she returns to the store to buy *more.*

Housewives like glass-packed foods because of their convenience and sanitary qualities. They like the clean, sparkling glass container because it permits 100% product inspection; serves as a storage jar; provides easy access to contents and affords efficient reseal protection. An Anchorglass container is inherently attractive; an honest container; inert to most products—preserving the delicate, fresh, true flavor of food products until consumed, and revealing them with all their colorful eye and appetite appeal.

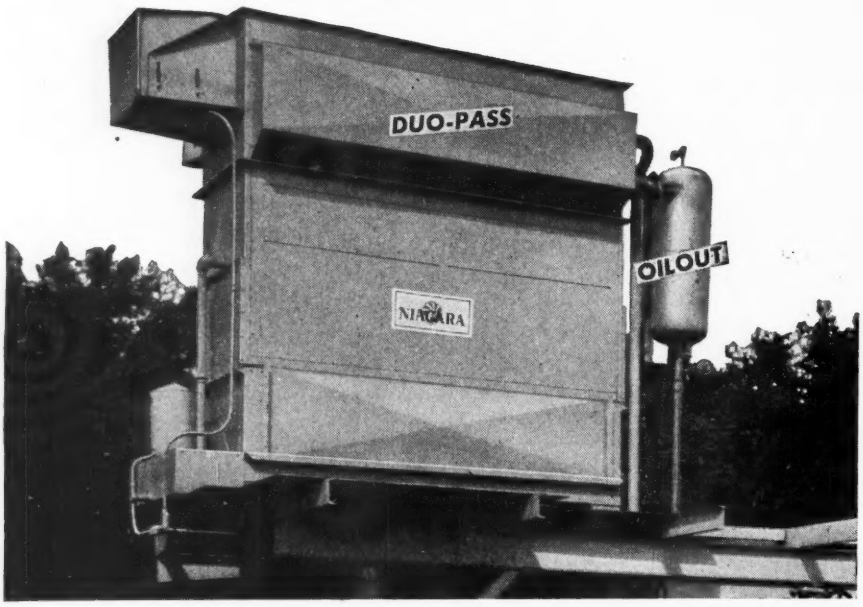
Because housewives *prefer* glass packages to other styles of containers is in itself sufficient reason for you to investigate modern Anchorglass packaging. But there are many other advantages to be gained by packing in glass which we would like to explain to you.

tune in ANCHOR HOCKING'S HOBBY LOBBY CBS NETWORK . . . THURS. EVE.

Anchor CONTAINERS AND CAPS

PRODUCTS OF
ANCHOR HOCKING GLASS CORPORATION
LANCASTER, OHIO

Get full capacity from your Refrigeration Plant!



For as long as six years NIAGARA Duo-Pass *AERO CONDENSERS have given their owners the benefits of greater production, and power and water savings without the loss of a single day's shut-down for cleaning.

That is because the action of the patented Niagara Duo-Pass always keeps the condensing surface clean, preventing the precipitation of salts or deposits of scale; the result is always full condensing capacity.

In addition, because the heat is transferred to air, not water, users benefit from the saving of nearly the full amount of condenser water.

Write for Bulletin 91 for complete information.

NIAGARA BLOWER COMPANY

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HUMIDIFYING • AIR ENGINEERING EQUIPMENT

Dehydrated Scrapple Developed at U of C

DEHYDRATED pork scrapple which is more palatable and resistant to rancidity than ordinary pork products has been developed by the University of California under a contract from the Office of Scientific Research and Development.

The study was begun when it was found that shipments of dehydrated pork to the armed forces developed rancidity in a few weeks, and presented a problem in the dehydrating process itself because of the high fat content of the meat. By developing a proper formula for scrapple, in which corn meal is added to the ground pork, the dehydration was made easier and the keeping qualities improved. Palatability tests showed that the reconstituted scrapple tasted better than reconstituted whole pork.

The work was done at the University by the department of home economics on the Berkeley campus under the direction of Dr. Agnes Fay Morgan, well known head of the department.

These studies are in line with a rapidly developing program in food research now being carried out by Dr. Morgan and her staff.

Kraft Foods Planning Research Expansion

KRAFT FOODS CO., Chicago, is planning an expansion of its research organization to a staff of 150 food technologists, chemists, bacteriologists, nutritionists and packaging specialists.

In anticipation of this expansion it has purchased the Glenview, Ill., building of Baxter Laboratories, Inc., manufacturers of pharmaceuticals. The building contains approximately 67,000 sq. ft. and will be occupied by Kraft Foods Co., when Baxter Laboratories, Inc., moves into its new building in Morton Grove, Ill.

Mass. State Offers Short Dairy Courses

PROFESSOR J. M. Frandsen of the department of dairy industry, Massachusetts State College, announces that the department will offer four special and practical short courses of interest to dairy people. The courses are intended to satisfy the needs of those interested in the various phases of dairy work, but who feel that they cannot be away for an extended period. The courses will run consecutively from January 26 to February

WALWORTH

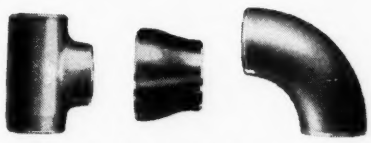
Pipe Fittings

A complete line of standardized types in

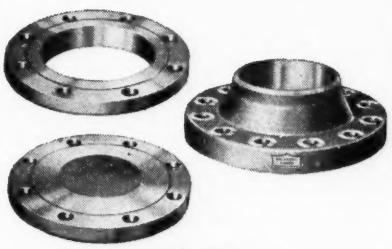
STEEL

in series 150 to 1500

Cast Steel Fittings

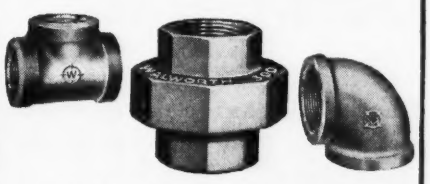


Steel Welding Fittings



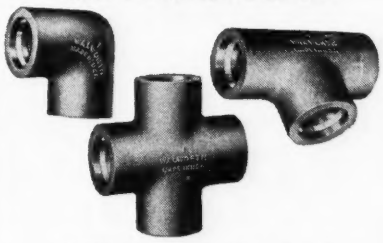
Forged Steel Flanges

BRONZE



125 Lb and 250 Lb, Screwed ends

150 Lb and 300 Lb Walseal ends

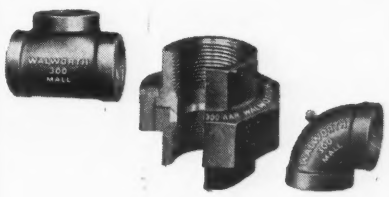


3,000 Lb O.W.G., Walseal ends

IRON

125 Lb and 250 Lb Cast Iron

150 Lb Malleable Iron



300 Lb Malleable Iron

Walworth's comprehensive line of pipe fittings is made in a wide range of types and sizes to meet every piping requirement. A few of the many regular Walworth fittings are illustrated above. All Walworth fittings are made to the highest standards of quality, both as to dimensional accuracy and metallurgical properties. In design, construction, and performance, they reflect Walworth's 103 years' experience in the manufacture of quality valves and fittings.

For detailed information on Walworth's complete line of valves, fittings, and pipe wrenches, see your local Walworth distributor or write for a free copy of Catalog 42.

WALWORTH

valves AND fittings

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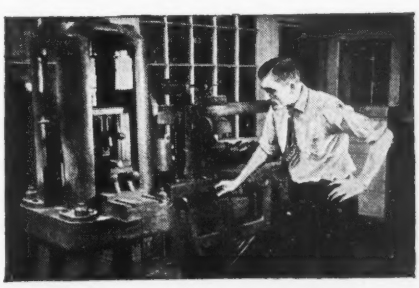
LABORATORY CONTROL



To assure strict adherence to specifications, sample test bars of the metals from which Walworth Pipe Fittings are made are subjected to regular testing in Walworth laboratories. These and other regular controls and inspections assure the high quality of all Walworth Pipe Fittings. The illustration shows a test on a cast iron transverse bar.

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STAINLESS STEEL STORAGE and PROCESSING TANKS

INCREASE PRODUCTION and EFFICIENCY IN YOUR PLANT WITH THESE SPECIALIZED TANKS

Metal-Glass San-I-Tanks give you safe, clean and rapid handling of any chemicals or liquids. These modern tanks are constructed throughout of 18-8 Stainless Steel making them immune to all acids and exceptionally easy to keep clean.

Tanks are finished with No. 4 polish on inside and bright finish outside. All Stainless Steel welded with inside welds ground smooth and polished.

San-I-Tanks incorporate special self-draining features with specially formed bottoms sloping to the front.

Built by tank specialists, San-I-Tanks incorporate every time saving, money saving feature. For years of trouble free service insist on San-I-Tanks.

MANY SIZES IN STOCK — READY FOR IMMEDIATE SHIPMENT

We endeavor to have a supply of stock sizes in San-I-Tanks on hand at all times. We have a tank for every application and in any size you need. Write us giving complete data on the size tank you need and we will, in many cases, have the tank in stock.

LET OUR ENGINEERS SOLVE YOUR SPECIAL TANK PROBLEMS

In addition to our complete line of stock sizes in San-I-Tanks which are stocked for immediate shipment, we also manufacture special sizes built to your requirements. If you have a special tank problem get in touch with us and our engineers will be glad to give you their suggestions. No obligation of course. It it's a tank problem we can solve it for you. Over 20 years of tank building experience backs the San-I-Tank so play safe and work with a tank specialist.

Write for Complete Literature and Prices

Metal-Glass Products Co.

Dept. FI. Belding, Michigan

16. Full information regarding these short courses may be secured from the department of dairy industry, or from the director of short courses, M. S. C., Amherst, Mass.

Oregon State Gives 25th Course in Food

THE Food Industries Department at Oregon State College, Corvallis, Ore., opens its 25th annual short course in canning and frozen food packing, February 4. The course, which runs for two weeks, deals with the handling, processing and packing of fruit and vegetables.

The subjects are designed especially to meet the needs of those now engaged in food processing and as a "brush up" course for veterans returning to the industry. In addition to general work on fruit, vegetable and frozen food packing, it includes a review of double seaming, field operations and the special problems of the small and custom canner.

Food Rulings

THE Food and Drug Administration has expressed in correspondence with food companies a number of interpretive opinions of importance and interest to all food manufacturers. These expressions of opinion, while unofficial, have been released for the past five years on an anonymous basis, available for inspection at the Food and Drug offices. FOOD INDUSTRIES summarized over 200 of them of outstanding interest and printed them between April, 1940, and April, 1942.

SCHEDULE OF EVENTS

JANUARY

9-11—National Dairy Council, 27th annual meeting and winter conference. Hotel Roosevelt, Pittsburgh.

FEBRUARY

3- 8—Food Processors, annual meeting, Convention Hall, Atlantic City.
National Canners Association.
National-American Wholesale Grocers Association.
National Food Brokers Association.
Canning Machinery and Supplies Association.

3—National Dehydrators Association, annual meeting, The Breakers Hotel, Atlantic City.

6—National Pickle Packers Association, annual meeting, The Breakers Hotel, Atlantic City.

19-21—Michigan State College, technical school for pickle and kraut packers, East Lansing, Mich.

25-Mar. 2—Chemical Industries, 20th exposition, Grand Central Palace, New York.

MARCH

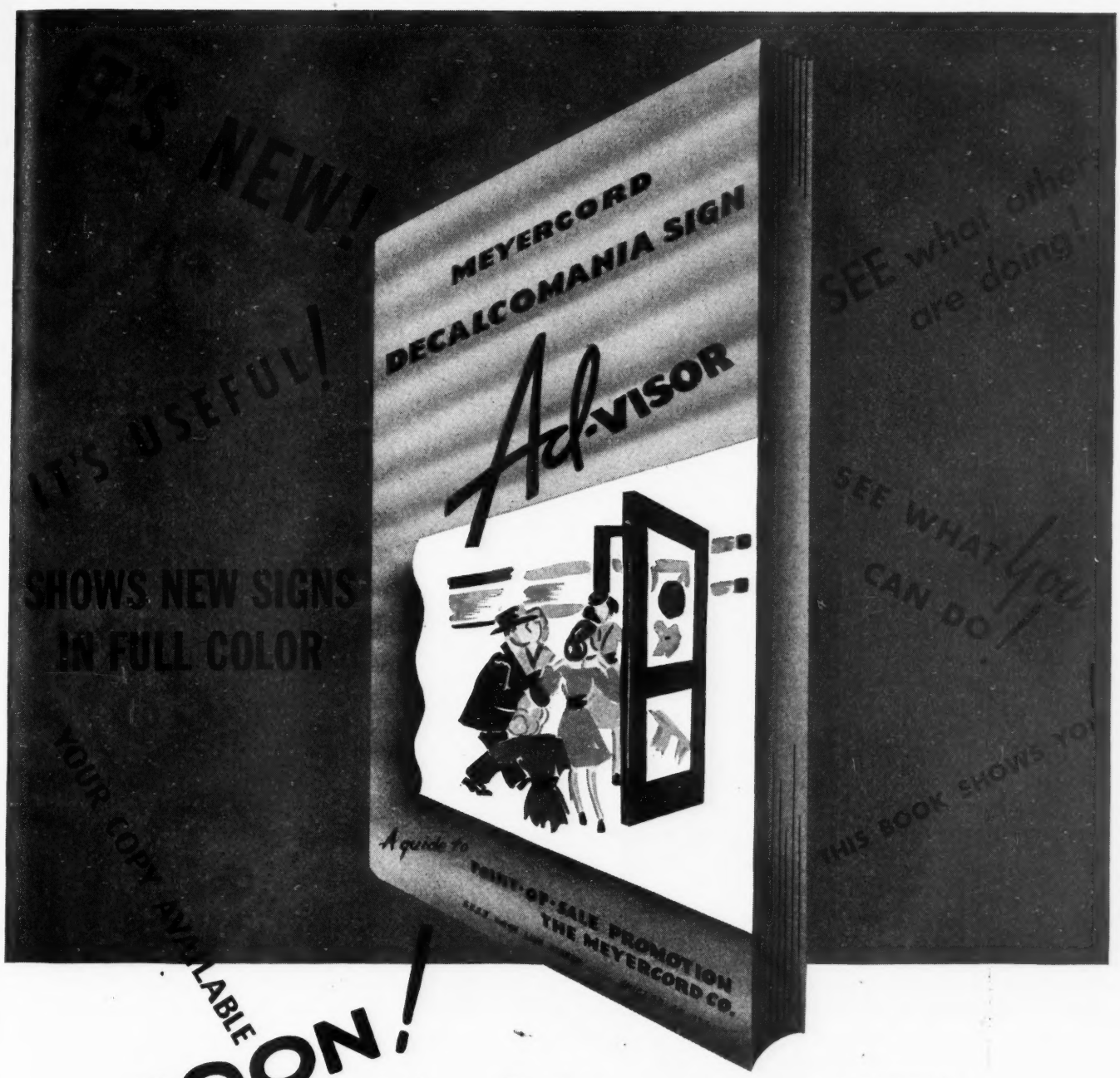
8—Canners League of California, annual meeting, Statler Hotel, Buffalo, Francisco.

11-14—American Society of Bakery Engineers, national meeting, Edgewater Beach Hotel, Chicago.

18-20—Institute of Food Technologists, annual meeting, Fairmont Hotel, San N. Y.

20-22—Chicago Technical Societies Council, production show and conference. Stevens Hotel, Chicago.

25-26—Associated Retail Bakers of America, national convention, Sherman Hotel, Chicago.



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Advertisers! . . . Agencies! . . . Merchandising men! This new, full color Decalcomania Sign Ad-Visor is packed with suggestions for dealer and product promotion and identification! A limited number will be ready for distribution early in 1946. Brochure shows where, when and how to use Decal point-of-sale signs, suggests unusual designs and treatment. Cash in on "sidewalk circulation" and "store-traffic" sales possibilities with colorful, lasting, low cost Meyercord Decals! Reserve your Sign Ad-Visor today. Address Dept. 65-12.

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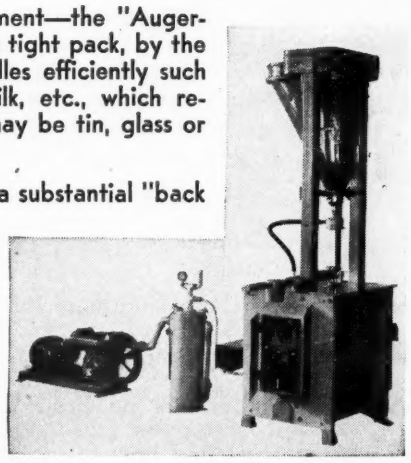
A Blue Ribbon Package

This package, a recent prize winner, was filled on one of Stokes' and Smith's "Better Machines for Better Packages".

Leaders in packaging everywhere choose S & S filling and packaging machines —there must be a reason. If you have a filling or packaging problem, why not consult us about it?

Shown here is an unique S & S development—the "Auger-Vac". It insures a clean, dustless fill and a tight pack, by the combination vacuum-auger method; handles efficiently such powders as cocoa, spices, powdered milk, etc., which require some packing to fill. Containers may be tin, glass or fibre, but they must be air tight.



War time priorities forced us to build up a substantial "back order" file—which, with the flood of new orders constantly arriving, makes prompt deliveries out of the question. All orders will be filled as soon as possible . . . it pays to wait for an S & S Machine—the RIGHT machine for the job.

Meanwhile, consult us about YOUR packaging problems. There's no obligation.

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Speeds to suit your needs — 15-30-60-120 per minute

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Rationing Shifted To Food Manufacturers

WELCOME as was the end of rationing of all food products except sugar, the event marks the shifting of a burden from one shoulder to the other, so far as grocery manufacturers are concerned, Paul S. Willis, president of Grocery Manufacturers of America, Inc., declared recently.

He pointed out that supplies of fats, oils and shortenings are still considerably under demand. OPA and food manufacturers together are working out a program that shifts the rationing burdens to the latter, he stated. The manufacturers will allocate their output of these basic food products to their customers in amounts proportionate to their use of them in the past.

Mr. Willis expressed his appreciation of a wire he had received from Chester Bowles, OPA administrator, complimenting the food manufacturers of the nation on their cooperation with his department during the war period. The telegram stressed the importance of continued cooperation on the part of American business men, if severe inflation is to be avoided.

Canned Food Demand May Rise 5 Percent

CIVILIAN demand for canned fruit and vegetable products is considerably above that of any previous level, in the opinion of the Department of Commerce, expressed through an industry report for August-September. How far above is not known, says the report, because supplies were inadequate for the past three seasons to cover all would-be purchases.

Total civilian sales of canned fruit and vegetable products reached their peak in the 1941-42 season. By comparing price and income relationships between that year and the current 1945-46 season, the report estimates an increase in demand of five percent or more above the earlier peak. This estimate also takes into account the long-time upward trend in the general consumption of canned foods.

Consumers To Decide On Delivery of Milk

AMERICAN housewives had notice from a government spokesman that it's up to them to decide whether they want milk dealers to return to daily milk delivery or retain every-

SEAMLESS

THE ONLY ONE OF ITS KIND IN THE WORLD . .

HUBBERT

STAINLESS STEEL KETTLES FOR 1946

ARE AVAILABLE NOW!

COMPARE

1. Seamless inner and outer shells . . . no welds to crack or corrode.

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2. Safe . . . no chance for "blown" inner shells at rated working pressures . . . ample metal thickness.

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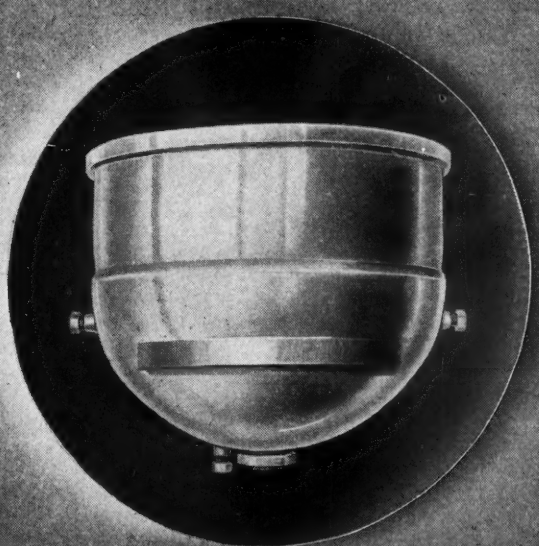
3. Sanitary . . . no cracks or depressions for dirt to cling to . . . easy to clean and to keep clean, inside and out.

COMPARE

4. Smart appearance . . . 1946 designs. Up to the minute in every respect.



COMPARE

5. Scientifically engineered for efficient cooking and even heat distribution. Proper working height. Perfect all-around performance.

Originators of the Seamless Drawn Stainless Steel Kettle

Watch for new developments—Sanitary Valves and Stirring Mechanisms—soon!

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EVERY HUBBERT SEAMLESS DRAWN STAINLESS STEEL KETTLE EVER SOLD IS IN ACTIVE DUTY TODAY

Your engineers have intimate knowledge of the requirements for new equipment in your plant — our *engineers know how to translate those requirements into stainless steel vessels which will work best in your processing operations. Let's pool this double engineering skill.*

We have specialized in the fabrication of stainless steel processing equipment since the alloy became a factor in the process industries. Our experience with this alloy is most useful to you when backed by your knowledge of the job to be done by the finished vessel. In that way you get processing equipment which lasts longer and works at lower operating cost. May we tell you more about our facilities and experience?

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SEND FOR THIS VALUABLE BOOK
A request on your letterhead will bring our guide, "What to Look For When You Specify Stainless Steel for Your Processing Equipment."

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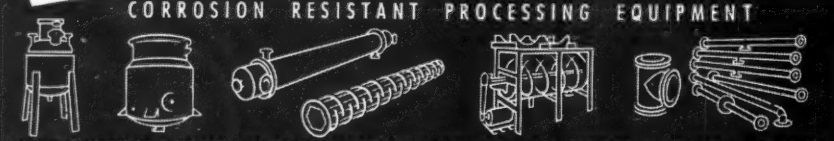

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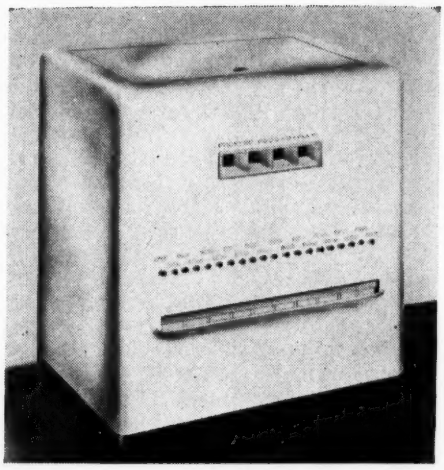

PUSH BUTTON FOOD
All the customer has to do here is push the right button and one of a choice of 20 food items immediately appears. The unit was designed by the Frosted Food-O-Mat Co., Glenshaw, Pa.

other-day deliveries at a saving in retail prices.

The warning was sounded by Hermon I. Miller, senior extension economist in the U. S. Department of Agriculture, Nov. 18, over the American Dairy Association's network radio program, "The Voice of the Dairy Farmer." Miller told millions of radio listeners that "the price you pay for a quart of milk will be higher or lower, depending on which delivery method you prefer."

ADA made the radio time available to Miller as part of its program of keeping the public informed on vital dairy problems.

Parity Price Formula Unsuitable As Guide

PARITY prices as now calculated are not suitable guides for goverment price supports, according to Dr. H. R. Wellman, Director of the Giannini Foundation for Economic Research at the University of California.

"The present parity price formula, based on the 1910-1914 average price, inadequately reflects changes in cost of production and ignores entirely the change in demand for agricultural products," he says.

The central theory of parity prices is that farm products should have a constant purchasing power, and if this is the case today it is only by accident. This is true, Dr. Wellman says, because the formula not only fails to take into account the cost of hired farm labor, but also uses the same price index for every commodity.

Dr. Wellman also points out that great changes in demand for various agricultural products have taken

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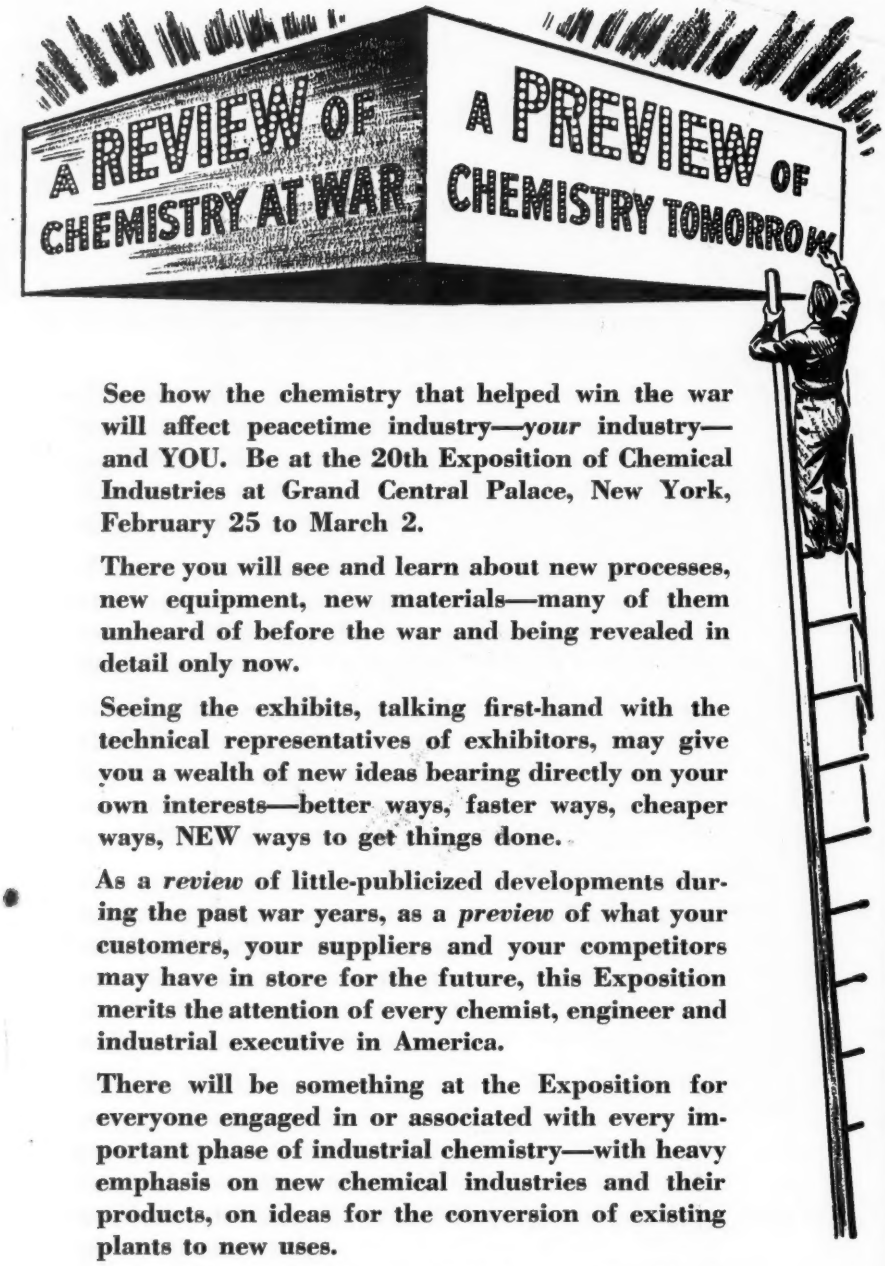
℞ New Ford Pickup Truck
TWO GREAT FORD ENGINES
The 100 H.P. V-8 • The 90 H.P. Six
Three-Quarter-Floating Rear Axle
BODY DIMENSIONS: Length 78¾ inches • Width 49 inches • Height 20.22 inches • Loading Height 23.73 inches • Load Space 45 cu. feet

New Ford Pickup Truck • Today's Ford Pickups are better trucks for *your* business. They're better trucks for *any* business. Exclusive Ford features and advancements make them roadworthy—streetworthy—farmworthy. Look below. You'll find advantages only Ford can offer—reasons why, year after year, registrations show "More Ford Trucks on the Road!"

MORE ECONOMICAL, MORE RELIABLE, MORE ENDURING THAN EVER!

TWO great engines—the rugged 100 H.P. V-8 with a score of important engineering advancements, or the 90 H.P. Six, for jobs that call for economical stop-and-go driving. Truck-type frame. Side-mounted springs. Three-quarter-floating rear axle with straddle-mounted pinion and 4-pinion differential. Four double-action shock absorbers. Note the generous dimensions of the heavy-gage steel Ford Pickup body, shown above—45 cubic feet of load space—wide enough for easy flat-loading of such 4-foot units as plywood or plasterboard (no wheel housings). Floor is heavy-gage steel-surfaced, with formed skid-strips and hardwood under-flooring. Tailgate, strong and rattle-free, swings full-down for loading.

Priorities No Longer Needed. Ford **See Your Ford Dealer!** **FORD TRUCKS**



See how the chemistry that helped win the war will affect peacetime industry—*your* industry—and YOU. Be at the 20th Exposition of Chemical Industries at Grand Central Palace, New York, February 25 to March 2.

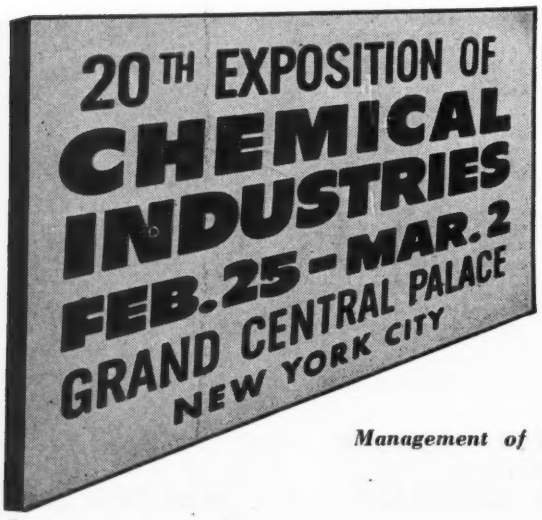
There you will see and learn about new processes, new equipment, new materials—many of them unheard of before the war and being revealed in detail only now.

Seeing the exhibits, talking first-hand with the technical representatives of exhibitors, may give you a wealth of new ideas bearing directly on your own interests—better ways, faster ways, cheaper ways, NEW ways to get things done.

As a *review* of little-publicized developments during the past war years, as a *preview* of what your customers, your suppliers and your competitors may have in store for the future, this Exposition merits the attention of every chemist, engineer and industrial executive in America.

There will be something at the Exposition for everyone engaged in or associated with every important phase of industrial chemistry—with heavy emphasis on new chemical industries and their products, on ideas for the conversion of existing plants to new uses.

Plan to be at Grand Central Palace in New York during the week of February 25 to March 2—and be sure to bring your key associates with you!



Management of International Exposition Co.

523

place in the past 30 years which are not taken into account in the present formula. Present parity policy, he concludes, will neither keep current consumption adjusted to existing supplies nor maintain a good production balance within agriculture itself.

High Candy Production Remains Under Demand

DESPITE the confectionery industry's all-time production high of 2,804,000,000 lb. in 1944, America's candy appetite went unsatisfied to the extent of 700,000,000 lb., Philip P. Gott, president of the National Confectioners Association, declared recently. The greatest contributing factor in the huge 1944 production was the tremendous purchase of confections by government agencies for inclusion in all combat and emergency rations and for resale through PXs and ships' service stores. Restriction to 50 percent of their 1941 sugar usage kept the confectioners 700,000,000 lb. below production for civilian needs, as estimated by the Department of Commerce.

The preliminary estimate for 1945 is 2,600,000 lb., despite the late year drop in production, which, according to latest department reports, has fallen as much as 13 percent below the corresponding month last year. This drop was due to the cessation of hostilities and consequent reduction in Washington candy purchases, Mr. Gott added.

Poultry Industries Plan High Quality

THE Institute of American Poultry Industries will hold its annual meeting and fact finding conference February 10-12, in the Little Theatre of the Municipal Auditorium, Kansas City, Mo., Dr. Cliff D. Carpenter, president, has announced.

Emphasis will be placed on what the poultry industry must do to maintain and encourage greater consumption of poultry and eggs through high quality products. Panel discussions on efficient processing operations, packaging, refrigerating and merchandising will highlight the conference.

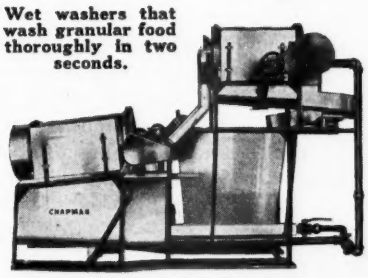
How science works for the egg and poultry business will be illustrated by brief summaries showing the practical application of vital research in breeding for better meat birds, feeding hormones for fattening, thermostabilizing (heat treating) shell eggs, pasteurizing dried eggs, and eliminating blood spots.

For the first time, equipment and

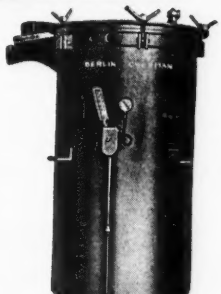
A COMPLETE LINE OF PRODUCTION FOOD PROCESSING MACHINERY

Let us tell you now how Berlin Chapman high speed equipment can help you attain both increased production and at the same time turn out the highest quality products. Berlin Chapman equipment is a line built for performance — and backed by over 35 years' successful experience in serving the food processing industries. Illustrated here are only four of the items from the complete line.

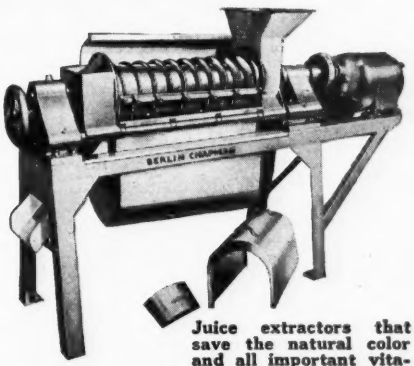
Exhaust boxes that exhaust every can in the same period of time, and with unlimited capacity.



Wet washers that wash granular food thoroughly in two seconds.



No Berlin Chapman Retort has ever been replaced by any other make.



Juice extractors that save the natural color and all important vitamins in your juices.

Write for complete information on any equipment you may need.

BERLIN CHAPMAN CO. • BERLIN, WISCONSIN

HIGH SPEED JUICE EQUIPMENT

- Juice extractors
- Juice tanks
- Coils
- Exhaust boxes

PEA PROCESSING EQUIPMENT

- Washers
- Blanchers
- Picking tables
- Separators
- Graders
- Regraders
- Elevators
- And all equipment necessary for pea processing.

TOMATO PROCESSING MACHINERY

- Soak tanks
- Rotary washers
- Scalders
- Roller inspection tables
- Peeling tables
- Screw type extractors
- Heating tanks and coils
- Tubular heaters
- And special machinery necessary for tomato processing.

CORN PROCESSING EQUIPMENT

- Corn silkers (high speed)
- Corn mixers
- Double batch corn mixers
- And other equipment necessary for corn processing.

COOK ROOM EQUIPMENT

- Retorts
- Continuous cookers and coolers
- Perforated crates
- Hoists

Berlin Chapman

CANNING MACHINERY FOR ALL FOOD PRODUCTS

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AIR MILES	2 lbs.	5 lbs.	25 lbs.	40 lbs.	Over 40 lbs. Cents per lb.
149	$1.00	$1.00	$1.00	$1.23	3.07
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549	1.07	1.42	3.84	6.14	15.35
1049	1.17	1.98	7.68	12.28	30.70
2349	1.45	3.53	17.65	28.24	70.61
Over 2350	1.47	3.68	18.42	29.47	73.68

Another drastic cut in Air Express rates now makes this high speed transportation more important to American business and industry than ever before!
Where, in the whole economy of business, do you get so much for your transportation dollar:

SAME DAY delivery between many airport towns and cities as far as 1,000 miles apart. (Less than 6 hours by air.)

SPECIAL HANDLING. Special pick-up and delivery (no extra cost) promotes speed of Air Express delivery.

GOES EVERYWHERE. In addition to 375 airport communities, Air Express goes by rapid air-rail schedules to 23,000 other important points in this country. Service direct by air to and from scores of foreign countries in planes of American manufacture and reliability giving American service, flying the American Flag!

WRITE TODAY for "Jig Saw Puzzle." It contains illuminating facts to help you solve many a shipping problem. Air Express Division, Railway Express Agency, 230 Park Avenue, New York 17. Or ask for it at any Airline or Express office.

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supplies will be exhibited at the fact finding conference. Displays of poultry pickers and eviscerating equipment, egg washers and graders, and new packaging materials are expected to draw a record attendance.

Frozen Food Merchants Form Trade Association

THE National Wholesale Frozen Food Distributors, Inc., was formed recently, at a meeting in New York, as a trade association to promote the interests of the frozen food industry. Wholesalers of frozen foods throughout the country were invited to take an active part in the organization through the executive secretary, Herman M. Levy, 152 Temple St., New Haven 10, Conn.

Burton L. Prince, Food Distributors, Inc., was elected president at the New York meeting; George McRoberts, McRoberts Bros., Jersey City, N. J., 1st vice-president; William Walsh, Morrison & McCluan, Pittsburgh, 2nd vice-president; Carl Seaburgh, Seaburgh Supply Corp., White Plains, N. Y., secretary.

Kroger Grocery Sales Show Big Increase

SALES of the Kroger Grocery and Baking Co. for the twelfth four week period ending December 1, totaled $40,127,209, an increase of 12 percent from the sales of $35,848,677 for the same period a year ago.

Cumulative sales for the first twelve periods of 1945 totaled $414,733,532, an increase of one percent over sales of $409,412,348 for the same twelve periods last year.

Average number of Kroger stores in operation during the period was 2,746 compared with 2,910 stores during the twelfth period of 1944, a decrease of six percent.

Fats Stay Short

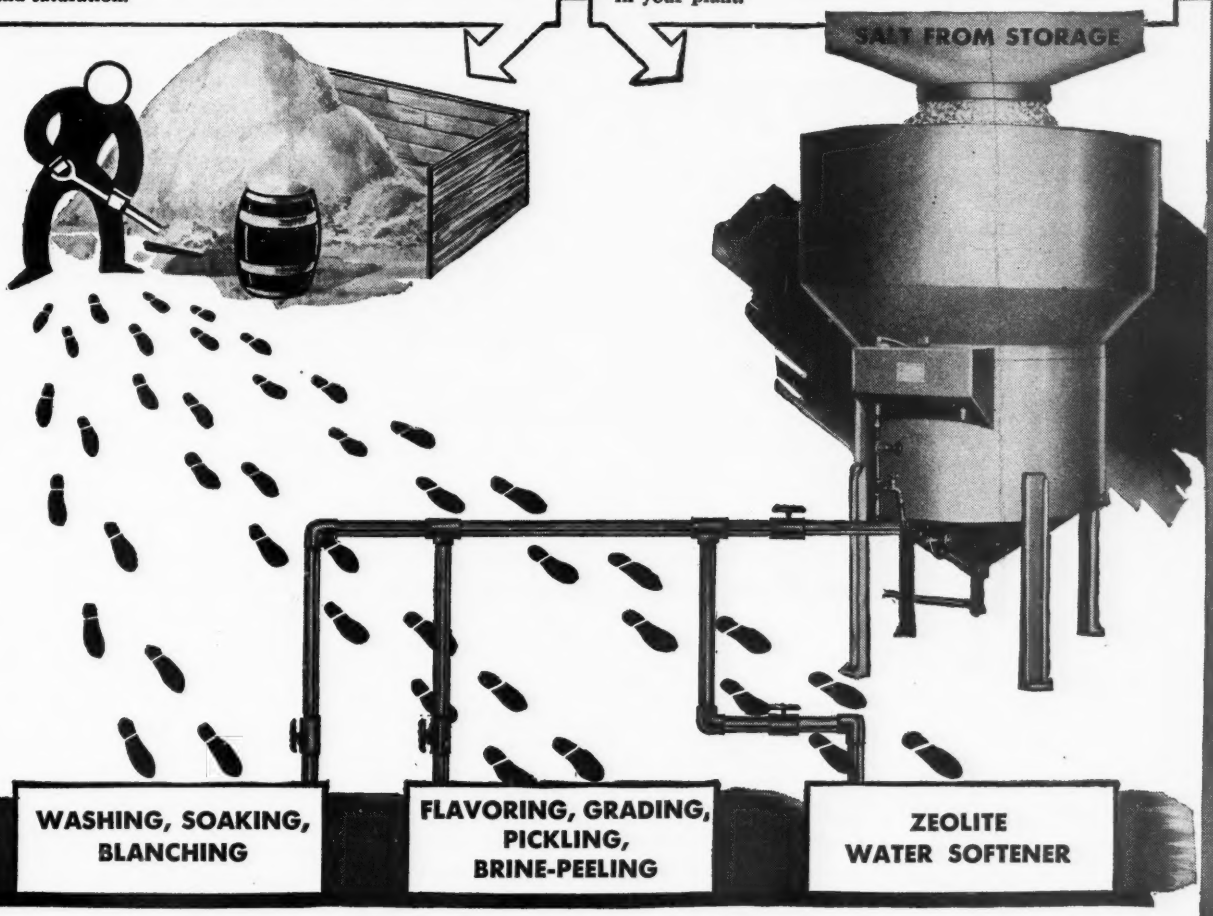
THE fats and oils shortage, declared by the Department of Agriculture, is likely to continue on a worldwide basis well into 1947. The domestic supply will be about 10 percent below the prewar level, in the first quarter, or about 5 lb. per capita below the 50 lb. per capita level consumed in December.

This report, issued early in December, is somewhat at variance with a Department of Commerce report on fats and oils for November. The latter report states that the output of edible fats for the 1945-46 crop year appears sufficient to satisfy the requirements for this country. It predicts consumption of

When you "PASS the SALT"

Old, Hard Way Wastes Man-Hours, Money!
From storage, salt must be repeatedly shoveled, measured, hauled, dumped, dissolved. Salt gets spilled. Time and labor are wasted. And resulting brine is of uncertain purity and saturation.

New, Easy Way Saves Man-Hours, Money!
From storage, salt feeds directly into Lixator hopper. 100% saturated crystal clear brine is produced automatically. Brine *flows* through pipes to any desired number of points in your plant.



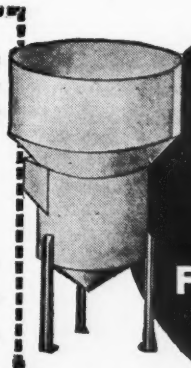
Salt handling ends where your automatic Lixator begins to operate. Using economical Sterling Rock Salt . . . the Lixator supplies 100% saturated, crystal clear brine which exceeds the most exacting chemical and bacteriological purity requirements—and it is piped to any point you wish. There's economy in its gravity flow—economy in its mechanical perfection.

By eliminating wasted man-hours and wasted salt due to handling, spills and dissolution in storage, Lixate users report savings as high as 20%. And remember, besides meeting all of your regular operating and processing needs, your Lixator provides a perfect brine for Zeolite water softeners.

Let us mail you our free booklet, "The Lixate Process for Making Brine." Its 36 pages are packed with useful information that can help you save money. Write today:

INTERNATIONAL SALT COMPANY INC.
Dept. FI-1, Scranton, Pa.

*Name*_____
*Firm*_____
*Street*_____
*City*_____ *State*_____



The LIXATE Process FOR MAKING BRINE

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INTERNATIONAL SALT COMPANY, INC.
Scranton, Pa.

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MOTOR CONTROLS

MANUAL A. C. STARTER. Bulletin 404—available for motors up to 5 hp 220 v and 7½ hp 440-600 v.

built to meet the needs of the

FOOD INDUSTRIES

Federal builds dependability into every motor starter that bears the Federal name . . . through exclusive features that assure positive protection and unfailing performance. Federal Motor Starter—Bulletin 404—typifies the high standards of design and manufacture that has helped to make Federal a "must" in important specifications throughout the food industries.

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6,800,000,000 lb., which compares with 5,800,000,000 lb. in 1944 and 6,700,000,000 lb. in 1940.

Ice Industries Plan Fresh Food Research

THE role of crushed ice in the preservation of nutritive values of fresh fruit and vegetables is to be the objective of a $50,000 research program announced by the National Association of Ice Industries at its 28th annual convention held recently in Chicago.

The research program is to be participated in by 20 colleges, experiment stations and universities throughout the country.

Stein Hall Moves "Hallmark" Plant

STEIN HALL MFG. CO. has sold its Chicago plant and is moving its manufacturing and processing operations to areas in which the major agricultural ingredients are produced.

In the case of its "Hallmark" precooked beans, Chicago plant operations will end December 15 to be resumed in the Lowell, Mich., plant of C. H. Runciman Co. as soon after January 1 as the plant installation can be completed.

Sweden's Meat

SWEDEN'S meat supply is running approximately 40,000 tons short, compared with prewar, according to information conveyed by the State Foodstuffs Commission to the American-Swedish News Exchange. The shortage is most marked in pork.

Give Blunt Warning on Monochloracetic Acid

USE of monochloracetic acid in foods is to be strictly forbidden by Food and Drug Administration because this chemical is "a poisonous and deleterious substance." This blunt warning was expressed by F&DA in a letter to an inquirer and the substance of the ruling has been given out for general industry guidance. The official stand rests firmly on previous court rulings. In them the courts have emphasized that such a component constitutes adulteration unless it can be proven that the chemical is present unavoidably following good manufacturing practice. Any addition for any purpose whatsoever that can be avoided is not permissible, according to the agency's letter.

What you should know about our big new radio show

It's "Celebrity Club"!

A half-hour show, "Continental Celebrity Club" has *everything* . . . a famous songstress, a top-notch comedian, genial host John Daly, a galaxy of guest stars, Ray Block and his orchestra, and a stirring dramatization of "the story behind the star." It's big-time!

Millions Listen!

Rating reports tell us millions of folks tuned in every week last year to our "Report to the Nation." Our exciting new show—on at the same time—is expected to become even *more* popular!

Folks Love It!

"Wonderful!" "Exciting!" "Entertaining!", say the fan letters that pour into Continental's offices daily. And—remember—a friend of ours is a friend of *yours!*

Coast to Coast!

147 stations on the Columbia Broadcasting Company's far-flung national network. Reaches into every nook and cranny of the great mass market that is America.

Famous Celebrities!

Stars of stage, screen and radio, as well as colorful, prominent personalities from other walks of life, are featured on every program . . . a big reason why Continental Celebrity Club draws so many listeners!

Sells for You!

Hard-selling (but easy-to-listen-to) commercials tell the American buying public the value of your products. It's your show as much as ours!

REMEMBER CONTINENTAL!

The only can company on the air

Continental's big radio show is doing a big job for you. Keep your eye on Continental and on our Triple C—the trade mark that stands for the best in quality, best in service.

Tune in!

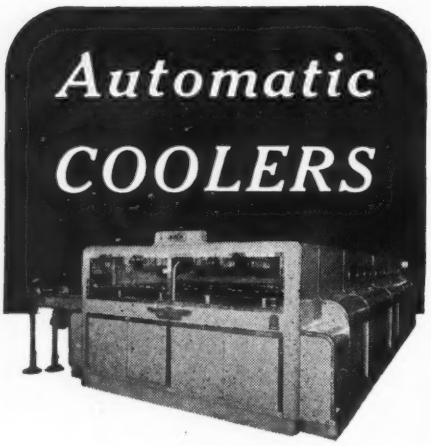
"CONTINENTAL CELEBRITY CLUB"

(SAT. AT 10:15 EST OVER CBS)

It's for you!

CONTINENTAL CAN COMPANY

100 East 42nd Street, New York 17, New York



for foods packaged hot

To be certain your products maintain the proper viscosity, preserve their original flavors and clarity, positive control over cooling time and temperature is necessary for accurate processing.

VORTEX coolers are special purpose units widely adaptable to individual requirements and are furnished for almost any capacity. Among the many features of the design are the patented "walking beam" conveyor, a smooth self-lubricating hydraulic drive, and the economical atomized spray system which achieves the thermal transfer.

Here is a machine that merits your immediate investigation. The VORTEX system is entirely automatic in operation, and its maintenance calls for only routine care.

It will pay you to obtain the technical bulletins on the VORTEX cooler. Consult our representatives or write today, stating your process requirements.

BARRY-WEHMILLER MACHINERY COMPANY

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INDICATORS

Production

Meat production, in Federally inspected plants during November was 1,610,000,000 lb., a 20 percent increase over October, according to the American Meat Institute. Beef showed a 2 percent decrease from the 750,000,000 lb. of the previous month—the highest production on record—and veal and lamb was 12 percent under October production. Pork was 84 percent above the October total, but 5 percent under the total a year ago.

Butter production, for the week ending December 8, came to 3,411,767 lb., which compares with 4,330,760 lb. produced in the corresponding week a year ago. This is a decrease of over 21 percent according to the American Butter Institute.

Oleomargarine production (uncolored) amounted to 33,765,520 lb., in September, compared with 48,821,030 lb. produced a year ago. Colored oleomargarine showed a sharp rise, however, amounting to 10,866,848 lb., in September, compared with 2,262,028 lb. in the same month last year.

Creamery production in October, estimated at 88,965,000 lb., was 12 percent lower than October, 1944, 30 percent lower than the ten year average, and the lowest output for the month since 1922. Total milk production, on the other hand, was estimated at 9,200,000,000 lb., up 2 percent from last October and the highest on record for the month.

Canned pea production for 1945 came to 39,649,000 cases, against the previous year's pack of 31,524,000 cases, according to the National Canners Association. The civilian supply this year amounts to 35,808,000 cases, which nearly doubles last year's 19,647,000 cases.

Poultry canning is rapidly declining toward its prewar level with October output coming to 5,815,000 lb., compared with the 10,432,000 lb. canned in October a year ago. The October output consisted of 5,344,000 lb. of chicken and 471,000 lb. of turkey.

Sweet corn production came to 29,538,553 actual cases in 1945, an increase over the 25,982,094 cases produced in 1944. On a 24/2's basis, this comes to 28,386,900 and 25,089,107 respectively.

Materials

Sugar production estimates for Cuba in 1946 have been revised upward and now stand at 4,500,000 lb., 15 percent greater than the 1945 output. The brighter outlook results from a favorable rainfall during July and August.

Dry casein production in October was 495,000 lb., 23 percent less than the same month in 1944, and the lowest production on record for that month. Stocks held by domestic producers continue at a high level with 8,050,000 lb. on hand October 31.

Flour milled in November showed a slight increase over the output of a year ago, according to *The Northwestern Miller*. The figure was 15,594,482 sacks, compared with 15,046,506 in November a year ago. In October the output amounted to 17,094,832 sacks.

In Storage

Frozen fish and shellfish holdings surpassed all previous records when they reached 138,433,844 lb. on November 1. This was an increase of 11,000,000 lb. over the previous month, 7,500,000 lb. more than were held November 1, 1944, and 27,000,000 lb. above the five year average.

Butter in storage on December 1 was down to 109,000,000 lb., a drop from 165,000,000 lb. on November 1.

Shell egg holdings of 309,000 cases on December 1 reflected a current spot shortage, representing about 20 percent of the five-year average.

Indexes

Wholesale price index of foods compiled by the New York *Journal of Commerce* showed 112.8 for the week ending December 15, compared with 108.6 for October and 110.1 for December a year ago.

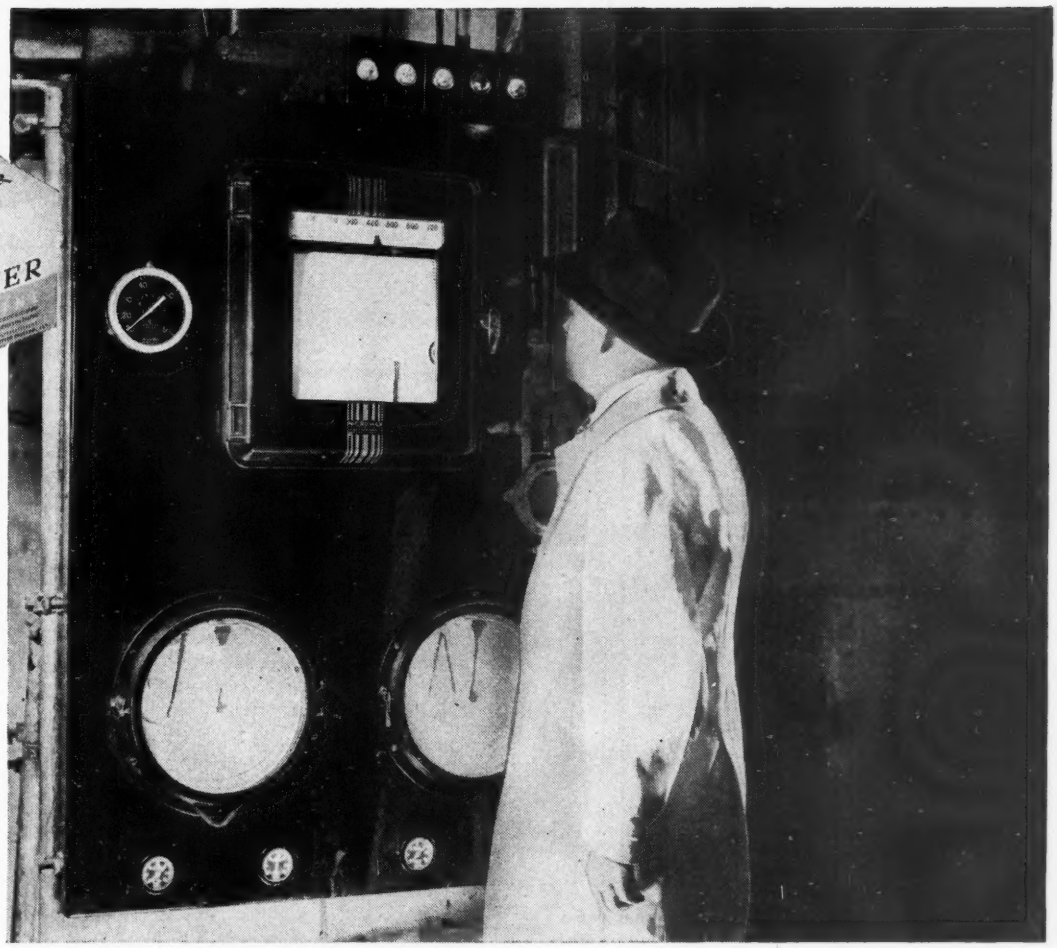
Business Week's index of business activity was 170.0 for the week ending December 15, as against 165.4 a month earlier and 230.8 a year ago.

Wholesale food prices for the week ending Dec. 15 stood at 108.3, as against 107.2 a month earlier and 105.7 at the end of the corresponding December week in 1944.

CONSTRUCTION NEWS

	Pending (thousands)	Awarded December (thousands)	Total Awarded 1945 (thousands)
Bakery	$ 4,885	$ 95	$ 1,421
Beverages	3,925	2,965	9,246
Canning and Preserving	....	100	3,385
Cold Storage	1,100	290	4,857
Confectionery	....	....	1,635
Grain Mill Products	1,580	915	16,986
Ice, Manufactured	....	283	1,862
Meats and Meat Products	560	60	1,118
Milk Products	320	497	8,837
Miscellaneous	2,020	5,331	19,838
Complete			
1945 total	$14,390	$10,536	$69,185

Various Armour products are made from the oils and fats which are processed with the help of the Micromax Temperature Recorder.



Both the process engineer and the Micromax Recorder are alert to meet distillation's precise temperature requirements, in Armour and Co.'s Chemical Division Fatty Acid Plant, Chicago. The Micromax record of several temperatures, conveniently shown on one easily-readable chart, makes for speed and efficiency.

ARMOUR'S TEMPERATURE FACT-FINDING SPEEDED AND SIMPLIFIED BY MICROMAX

From raw oil to finished product, oil and fat refining is a series of "at temperature" operations. And for keeping constant tab on temperatures, Armour and Co., in its fatty acid plant, finds Micromax instruments extremely dependable.

Eight temperatures in each distillation tower are first detected by sensitive thermocouples . . . then shown by a Recorder on a multi-color, well-spaced record which is quickly and easily read. A typical record displays temperatures of Finished oil, Fatty acid top tray, Hot oil tower base, Hot oil from heater, Hot oil top tray, Oil to deodorizer, Fatty acid to tower, Raw oil.

Micromax equipment is definitely heavy-duty. Thermocouples and leadwires, if damaged, can be replaced without impairing the instrument's calibration. The Recorder is sturdy, yet micro-responsive. It can be supplied to record as many as 16 temperatures, and in models and ranges suited for solving almost any temperature-measuring problem.

An L&N engineer is prepared to discuss any application in which you're actively interested. Or you'll find general information in Catalog N-33A, sent on request.

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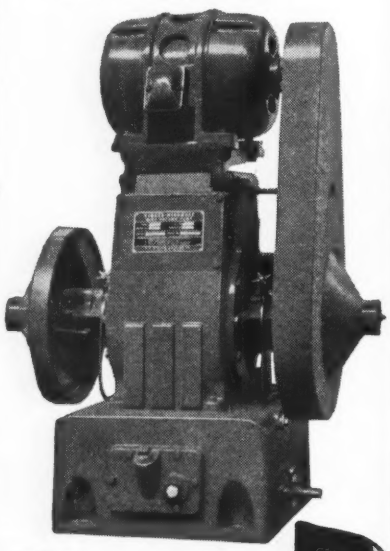
MEASURING INSTRUMENTS • TELEMETERS • AUTOMATIC CONTROLS • HEAT-TREATING FURNACES

Stokes MICROVAC Pumps
HEART OF HIGH VACUUM SYSTEMS

- Higher Vacuum (in the low micron range)
- High volumetric efficiency
- Low power requirement
- Complete discharge of air — no re-expansion
- Continuous dehydration of oil — no moisture to re-evaporate
- Discharges sudden slugs of liquid without injury
- Easily accessible, non-corrosive discharge valve
- Rugged, compact, simple construction
- Long life . . . negligible maintenance
- Five sizes — from 10 to 235 cu. ft. per min.



Stokes VACUUM GAUGES
(Patented McLeod Type)
Are Always Accurate

- Require no calibration
- Rapid readings
- Simple to operate — just tip and read
- Two models — (AA) — 0 to 5000 microns (BB) — 0 to 700 microns, with readings to 1/10 micron.

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Stokes *High Vacuum*
PUMPS · GAUGES · EQUIPMENT

What Washington Thinks

By R. S. McBRIDE, Washington, D. C.

CONTROL BY CONTAINER—Department of Agriculture officials are attempting to control the distribution of fats and oils in some measure by specifying the proportion of packages of any one size that may be used for lard, shortening, and various edible oils. Packaging practice must be the same as during either 1944 or 1945 according to the kind of food fat. Industrial users of fats and oils are thus to be restricted or protected, as the case may be, in accordance with their old fat supply under former War Food Orders. This seems to be rather a feeble and prospectively ineffective substitute for rationing.

SUBSIDIES END—Prices of many foods have been held down by government subsidies, practically all of which will end by the 1946 mid-year. It is expected that the nation's food bill as paid by the average housewife will, therefore, be nearly $2,000,000,000 greater. This means that the average cost per person for food will be about $15 more per year than under the wartime subsidies. It will be fortunate if food processors are not blamed for these increases.

PEPPER PROBLEM—Quarrelling in Indonesia will not end when the superior British military force stops native insurrections. Washington guesses that pepper supply from the Netherlands East Indies may remain less than enough for normal needs for even longer than the fighting continues. Since only 2,000,000 out of 60,000,000 lb. of black and white pepper comes normally from India, it is evident that the vast majority of sources of pepper supply are still involved in war difficulties. And, of course, sugar, tapioca and rubber are also similarly affected.

FOOD IS FOOD—The ruling of Food and Drug Administration frequently repeat the admonition that use of nondigestible mineral oil as a substitute for food oil produces an "adulterated" food. Recently F&DA in applying this principle undertook to crack down on those who distributed a salad dressing containing mineral oil through restaurant and hotel channels. Such a "food" is not a food.

SPEECH MAKING — Secretary of Agriculture Anderson is devoting practically all of his time to speech making in the agricultural areas of the country. The Democratic administration found itself slipping from favor with farmers. Rebuilding the political fences was deemed more important than intimate direction of War Food Administration's successor group by the secretary in person. Fortunately the career men in PMA seem able to handle promptly the remaining problems of food administration during this reconversion period. It's nickname is, by the way, "Post Mortem Agency."

FREEZE TO CONCENTRATE—U. S. Department of Agriculture is boosting the idea that the best way to make a concentrated citrus juice is by freezing. Concentrate made by freezing instead of boiling better retains its volatile flavor and aroma, retains unchanged the fruit acids, sugars, and pectin, and yet has the advantage of smaller bulk and weight for distribution in common with the concentrate made by any other method.

TO PRIVATE TRADE—Government-managed business is being restored to private controls as fast as practicable. The President's war powers have been extended for six months only, not the year requested. Even import of rotenone will be private business soon, when government control of imports ends for this and numerous other commodities. Any food firm that thinks it is being too long managed by Uncle Sam now has plenty of precedent to offer when it argues for freedom from war restrictions.

CHANGE OF ADDRESS

DIRECTOR OF CIRCULATION, FOOD INDUSTRIES
330 WEST 42nd STREET, NEW YORK 18, N. Y.

Please change the address of my Food Industries subscription.

Name .....

Old Address .....

New Address .....

New Company Connection .....

New Title or Position .....

LABOR COOPERATION—Washington has recently seen a most unusual case of food company workers picketing competitor's customers in order to protect business for the boss. One of the big pie companies of the Capital City was shut down by the health authorities because of insanitary conditions requiring considerable remodeling to eliminate the danger of bacterial contamination of pie fillings. The company's drivers undertook to block pie deliveries from competitor companies to the regular customers of the firm closed down. Apparently they realized that their own jobs were also at stake. Incidentally, this shut down is only one of the series of housecleaning efforts now being attempted in Washington because the war is over and clean-ups, which seemed impossible in the crowded Capital City at an earlier date now are believed to be feasible at long last.

MORE SUGAR—Officials admit that sugar's scarcity and rationing will last all of this year, and some privately think that the scarcity will be with us for much of 1947. The Department of Agriculture has made one more effort to offset the scarcity by a request for 31 percent more sugar beet acreage in 1946 than last year. That sounds like a huge increase. But it starts from a wartime low level, which means that if realized we will have only 12 percent more beet sugar next year than in a normal prewar season. The boost for continental sugar cane acreage is 8 percent, in the crop goal plan. And we are not sure that either beet or cane producers on the farms will respond fully to the goal requests.

PUBLIC OPINION—Congress undoubtedly responded to the public demand for more food for Europe when it passed appropriations for UNNRA. Whether this clamor to relieve Europe's famine will go much farther is not so sure. It is not expected by Washington to create any demand for renewed rationing as a means for compulsory tightening of belts here to feed more folks abroad.

YEAST AS FOOD—Washington again notes the possibility of making a very concentrated food from waste carbohydrates. Renewed interest in this possibility is stimulated by a report through OPB on the German methods of manufacture of Torula food yeast. The product so made is a concentrated protein, high in vitamins, and sometimes high in fat, using waste carbohydrates as the principal raw material If nitrogen yeast food is not available, the process uses both nitrogen fixing bacteria and yeasts, which grow together in a mutual aid society giving the valuable product without chemical stimulant. It remains to be seen whether this new food industry possibility has any practical opportunity in the U. S.

How to raise a steady customer

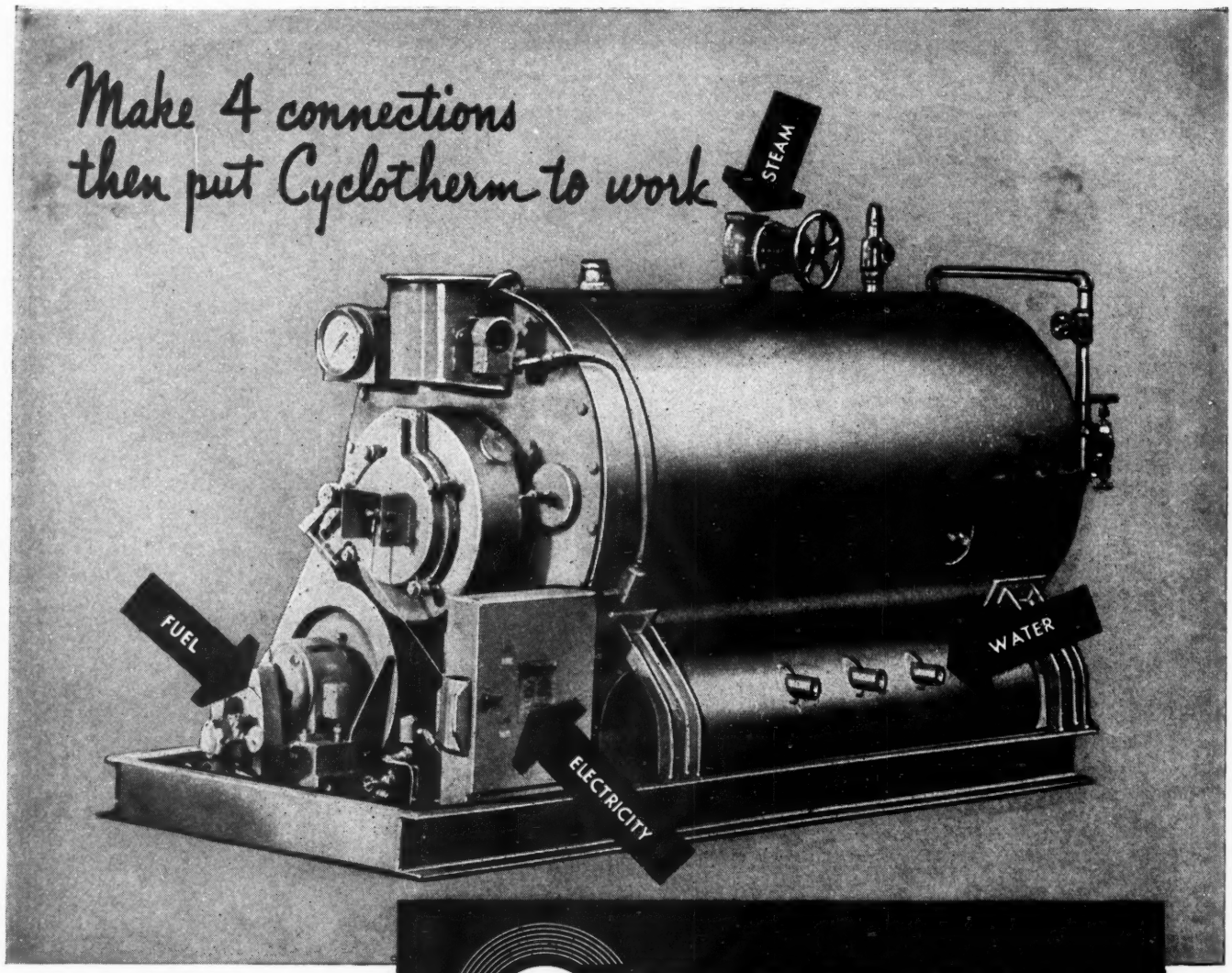
First-time tasters become long-time customers when you intrigue them with Ethavan* — Monsanto's Ethyl Vanillin — in your candies, confectionery and bakery goods.

Ethavan is "keener" than vanillin. It has a more pronounced flavor, a more pleasing aroma. Experienced users find that it "stays," even when products are subjected to high temperatures in processing. With approximately three times the strength of vanillin, Ethavan is economical to use, even though it is higher in price.

Try Ethavan. Send for experimental samples — you, too, may find that its added taste appeal is soon reflected in increased customer loyalty. Just call the nearest Monsanto office or write: MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1700 South Second Street, St. Louis 4, Missouri.
District Offices: New York, Chicago, Boston, Detroit, Charlotte, Birmingham, Los Angeles, San Francisco, Seattle, Montreal, Toronto.

**Ethavan, Reg. U. S. Pat. Off.*

MONSANTO CHEMICALS
SERVING INDUSTRY . . . WHICH SERVES MANKIND



30 HP Cyclotherm Oil-Fired Unit

CYCLOTHERM
STEAM GENERATOR

Your Cyclotherm Is Ready

Order your new post-war Cyclotherm now.

Cyclotherm is available *without* priority for fast delivery. Once your order is received action is immediate.

Your Cyclotherm comes to you a completely assembled, packaged unit. It needs no special foundation, or base; no stack. Installation consists only of connecting steam, water, fuel and electric lines. Your Cyclotherm can be producing steam in a matter of hours after delivery to you.

Cyclotherm units range from 5 HP to 200 HP with operating pressures from 15 psi to 200 psi. They are completely self-contained, automatic, oil or gas fired. They are designed on unique principles of combustion that give top efficiency while holding operating and maintenance costs to a minimum.

Thousands of Cyclotherm units were in war service throughout the world with the Army, Navy and Marine Corps. Their record of accomplishment is your best guarantee of the engineering "know-how" back of a Cyclotherm, and the quality built into every unit.

What the Veteran Cyclotherm did in the four corners of the world, the post-war Cyclotherm will do for you, whatever your use of steam may be.

Your order for a Cyclotherm will be filled promptly.

CYCLOTHERM CORPORATION • Box 201 • 90 Broad Street, New York 4, N. Y.

MEN • JOBS • COMPANIES

INDUSTRY

J. R. Agen Co., Seattle, will complete construction of a $200,000 quick freeze plant by June 1. The new facilities will be used to process vegetables and fruits for carlot shipment.

Birds Eye-Snider division of General Foods Corp. has begun construction of a new frozen food processing and packaging plant at Walla Walla, Wash. The new facilities will provide greatly increased production of Birds Eye peas, spinach and broccoli.

Bluhill Foods, Inc., Denver, plans a $750,000 expansion program which will double the company's capacity for production of a score of food products. Included in the program is the purchase of 40,000 square feet of floor space of the Santa Ana plant formerly owned by the California Packing Co.

The Bryo Co., Chicago, manufacturer of wheat germ products, recently opened a new laboratory, with Charles B. Kress as chemist in charge.

J. B. Carr Biscuit Corp., Wilkes-Barre, Pa., is proceeding with its peacetime expansion program, including a modern bakery in St. Louis and enlargement of facilities in Wilkes-Barre and Greenwood, S. C.

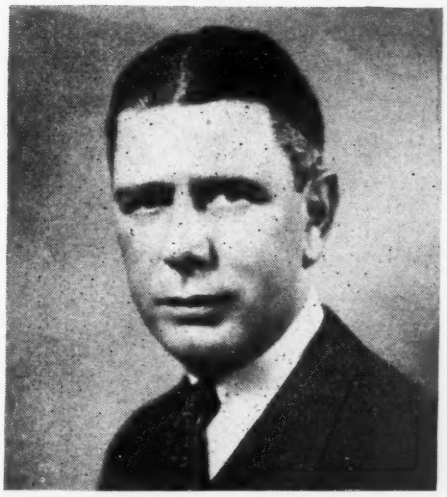
Columbia Malting Co. is building a 15,000 sq. ft. addition to its Chicago plant which will provide increased malting capacity and an overall modernization of facilities.

Continental Grain Co. has purchased the Houston Milling Co., Houston, Tex. Eric B. Rainer, president of the Houston company, has been elected a vice-president of Continental and will continue in full charge of operations.

The Cudahy Packing Co., Chicago, has announced the election of J. W. Christian, D. K. Sanders and Hugo Wesin as vice-presidents and directors. All three have been with Cudahy for many years.

Dawson's Brewery, Inc., New Bedford, Mass., has undertaken a $1,000,000 expansion program that will more than double the firm's capacity. A fermenting plant and bottling shop will be constructed on the firm's property in New Bedford.

Franklin Baker Division of General Foods Corp. has moved all general offices to the plant in Hoboken, N. J.



GEORGE V. ROBBINS

At its recent annual convention, members of the National Coffee Association elected George V. Robbins of the California Packing Corp., Brooklyn, N. Y., as president of the association. He succeeds George C. Thierbach.

DR. JOHN A. CLAGUE

Maxson Food Systems, New York, has announced the appointment of Dr. John A. Clague as chief food technologist, with headquarters in the Queens Village, N. Y. plant. He formerly was chemist with the National Canners Association.

George Hampton has been named general manager of the operation and James H. Baker continues in charge of manufacturing, engineering and purchasing for the Division.

Froedtert Grain and Malting Co., Milwaukee, has begun excavation work on a new $2,250,000 malt house, which will compose the third unit in the Milwaukee plant of the company.

International Milling Co., Minneapolis, has purchased the entire stock of Shellabarger's, Inc., Salina, Kan. Operations will continue without change of management or policies.

Kinston Packing Co., Kinston, N. C., capitalized at $250,000, plans to build a large, fully equipped meat packing plant in that city.

New York Frozen Foods Corp. has broken ground for a new plant in Brockport, N. Y.

Northwestern Yeast Co. has purchased Fearn Laboratories, Inc., Chicago, maker of curing and seasoning compounds for the meat packing industry.

Swift and Co. has taken over the properties and operations of the Columbus, Ohio, meat packing plant recently purchased from Kroger Grocery and Baking Co. Properties include the livestock yards at Chillicothe, Kenton and Highland. The plant and yards will continue to operate with present personnel in the buying and slaughtering of hogs, cattle, calves and lambs. Robert W. Record, for 21 years with Swift and Co., will be manager and Ed Badertscher will continue in charge of the livestock yard at Kenton.

University of Washington, School of Fisheries, Seattle, as a result of worldwide demands for more trained personnel, has stepped up its program to instruct men for fishing and allied factory enterprises. The new courses will be presented by eight representatives of fishery industries and government agencies, who will conduct classes on world fisheries, biology, technical training and utilization of by-products.

Walton Rice Mill, Inc., is constructing a $350,000 plant at Stuttgart, Ark., which will utilize a new rice process invented by an army sergeant attached to the Cooks and Bakers School at Fort Meade, Md. The new operation is scheduled to get underway early this year.

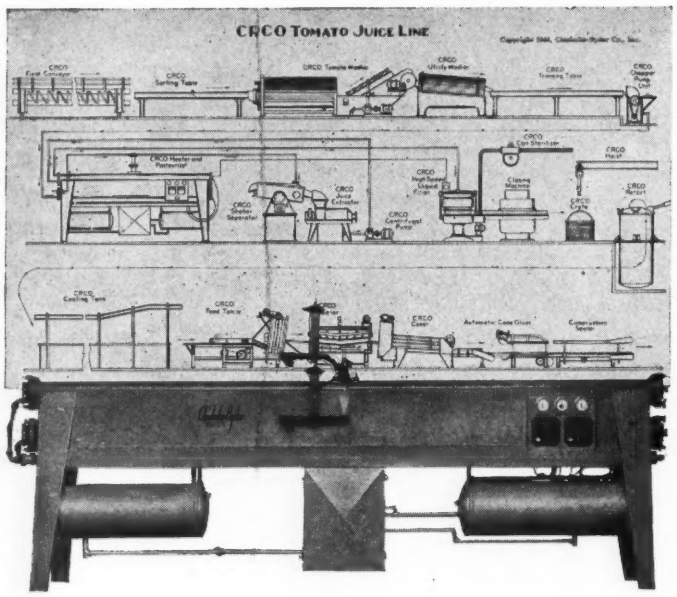
PERSONNEL

C. E. Baker, Jr., formerly cereal technologist for the Quartermaster Corps Subsistence Research and Development Laboratory, Chicago, is now manager for Cooperative Mills, Inc., Auburn, Ind.

Dr. Ernest H. Bancroft, South Barre, Vt., has been reelected president of the New England Dairies, Inc.

OVER HALF A CENTURY OF KNOWING HOW 1890 – 1945

CRC CONFIDENCE ... born of experience



For Better Quality on the Juice Line

CRCO-American Vacuum Steam Design Pre-Heaters insure full-flavored Tomato Juice in greater quantity at lowered labor and maintenance cost. They are faster, require less attention because they are entirely automatic and they heat evenly without danger of overheating, burning-on, or scorching. The thermostatic controls are quick, positive and always automatic. Available in single or double-tube models in any length for any desired capacity.

THE BEST OF Everything

CHISHOLM-RYDER

Niagara Falls, New York

FOR · THE · FOOD · PROCESSOR ·

George W. Beach, former assistant technical director of Gelatin Products Co., Detroit, has become director of research of Libby, McNeill and Libby's general laboratories, Blue Island, Ill.

H. G. Beattie, who has been in the chemical division of New York State Agricultural Experiment Station, Geneva, N. Y., is now in the research and development department of the national bakery division, Atlantic and Pacific Tea Co., New York.

Richard A. Buck has been appointed assistant manager of the bottling department of Pepsi-Cola Co., Long Island City, N. Y.

Horace Campbell recently has been appointed food technologist of the new processed foods division of American Fruit Growers, Inc., Los Angeles. He formerly was in the commodity processing division of Western Regional Research Laboratory, Albany, Calif.

W. E. Chambers, for 35 years in charge of operations at Jacobs Mushroom Co., Westchester, Pa., a subsidiary of Grocery Store Products Co., has resigned to go to Campbell Soup Co. He will be in charge of Campbell's new mushroom growing program.

Charles B. Coates, formerly associate editor of Factory Management and Maintenance, has joined General Foods Corp. as assistant director of the public relations department.

W. C. Cole has been appointed director of research at Arden Farms, Inc., Los Angeles. Mr. Cole was formerly associate in dairy industry at the University of California where he specialized in research and instruction in ice cream manufacture.

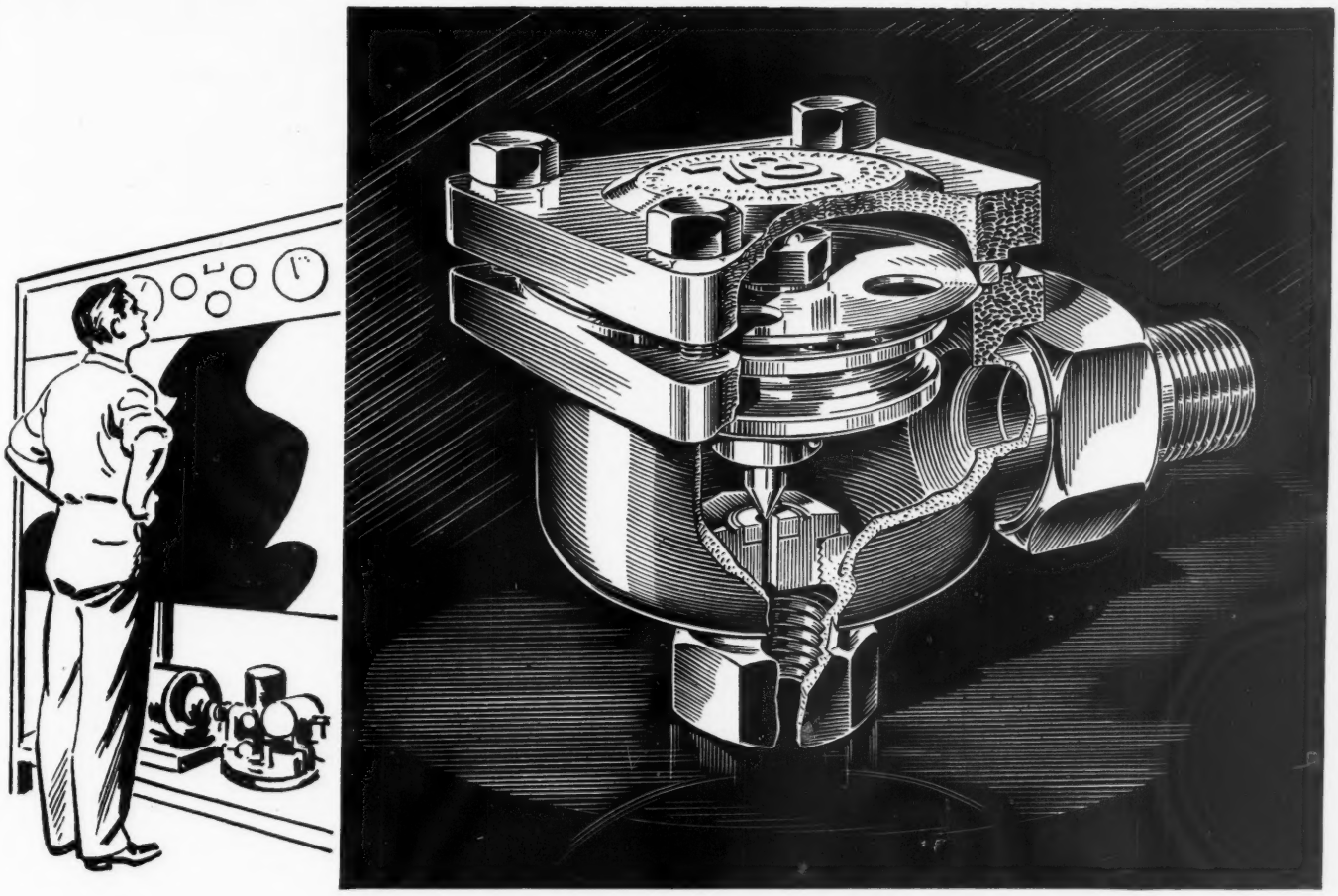
Le Von Damir has rejoined Merced Dry Yard Co., Merced, Calif., as head of production, after spending several years with the Navy.

Maj. Carl R. Fellers has returned from Sydney, Australia, where he has been in charge of the Army laboratories for testing subsistence tenders, to resume his duties as professor of food technology at Massachusetts State College, Amherst, Mass., after an absence of about four years.

Stephen L. Galvin has become technical service director of the Huron Milling Co., with headquarters in the New York office.

Elmer F. Glabe, formerly chief chemist for Stein Hall Manufacturing Co., Chicago, is now director of food research for Automatic Canteen Co. of America, Chicago.

Harold Hall, formerly vice-president of J. R. Short Milling Co., Chicago, and for three years in the procurement division of the Quartermaster Corps Depot, Chicago, is now with American



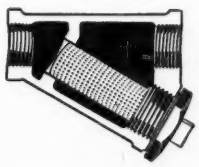
"Because it pays for itself in increased efficiency . . .

"We have done away entirely with our old-fashioned master traps and are using a separate trap on each process-steam-using unit. This is now accepted engineering practice . . ."

By the use of individual Webster Series "78" Thermostatic Traps on each unit of process-steam-using equipment, prompt, complete and continuous discharge of *both* air and water is assured. There's no air binding. No water logging. No loss of "live" steam. No time-loss in heating-up . . . You get *full* efficiency in the operation of your equipment.

Webster Series "78" Thermostatic Traps are not just an adaptation of a low pressure design to high pressure duty. They have been developed *from the ground up* for operation at process pressures—from 15 to 150 lbs. per sq. in. They cost more than ordinary traps, but the improved operating efficiency of your steam-using equipment will soon return your initial investment.

For data on capacities and ratings, write for Webster Bulletin B-1200 F. It contains sectional illustrations and descriptions of the design and construction of Webster Series "78" Thermostatic Traps. It's yours for the asking. Write Dept. FI-1



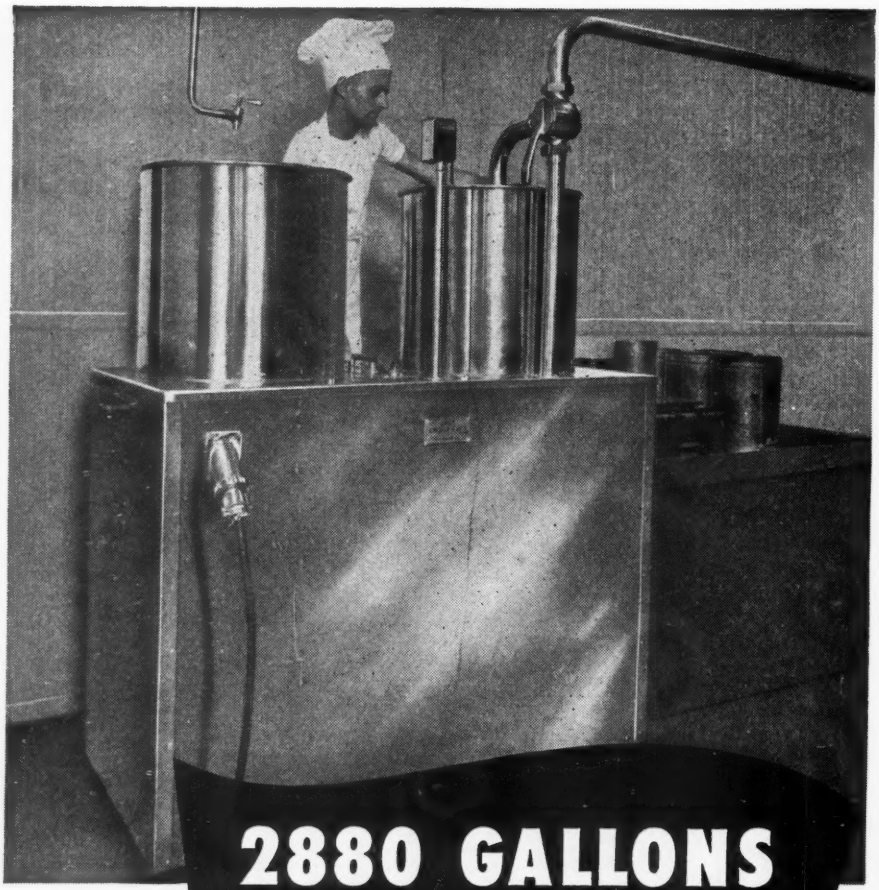
Webster Dirt Strainers placed ahead of Webster Traps protect the Traps against pipe scale, dirt and sediment. Basket easily removed for cleaning.

By the makers of Webster Heating Systems

WARREN WEBSTER & COMPANY

Main Office and Works, Camden, New Jersey :: Established 1888

Representatives in principal cities :: In Canada, Darling Bros., Ltd., Montreal



2880 GALLONS BY 5 O'CLOCK!

The 1946 Case Emulsifier produces—*with but one operator*—360 gallons an hour of finer, firmer, more stable products which resist the hazards of time, shelf-life, storage and transportation.

The self-contained Case unit requires no pre-mixing nor beating mechanism. Liquid ingredients flow from individual supply compartments into the emulsifying devices, where perfect blending of all components takes place. The emulsion is then delivered directly to the filling equipment by a turn of a valve.

Sanitary stainless steel construction simplifies cleaning. The Case Emulsifier is moved easily from department to department for a variety of products.

Investigate today. The Case Emulsifier will save your investment many times in reduced overhead, labor and power costs.

CASE

WRITE FOR FREE FOLDER
Field Engineers Available

EMULSIFIER-HOMOGENIZER

A. T. CASE CO. ★ 6107 AVALON BLVD. ★ LOS ANGELES 3, CALIF.

Dry Milk Institute in charge of Institute activities in Europe.

N. Lee Hickox, recently of the packaging section of the Quartermaster Subsistence and Packaging Research Laboratory, Chicago, is now with the Flex-Pack Division of Standard Cap and Seal Corp.

Maj. Maynard R. Joslyn, Q.M.C., has returned to the United States after a tour of duty in S.W.P.A. and the China theater lasting about three years. He was decorated for his work in China to establish a dehydration industry to aid in feeding Chinese troops. In civil life, he is professor of food technology, University of California.

Col. Paul P. Logan, deputy chief of subsistence, Office of the Quartermaster General, is retiring from the Army on February 1, to become research director of the National Restaurant Association. His headquarters will be in Chicago.

James H. McCall, vice-president of J. H. Allison and Co., Chattanooga, Tenn., is the new chairman of the board of directors of American Meat Institute, Chicago.

Dr. Milo N. Mickelson has joined the staff of the Midwest Research Institute, Kansas City, Mo. He was formerly professor of bacteriology and biochemistry at the University of Michigan.

James A. Moffett has been appointed manager of the foreign department of Corn Products Refining Co., New York. He returns to the company after more than four years of active duty with the Navy.

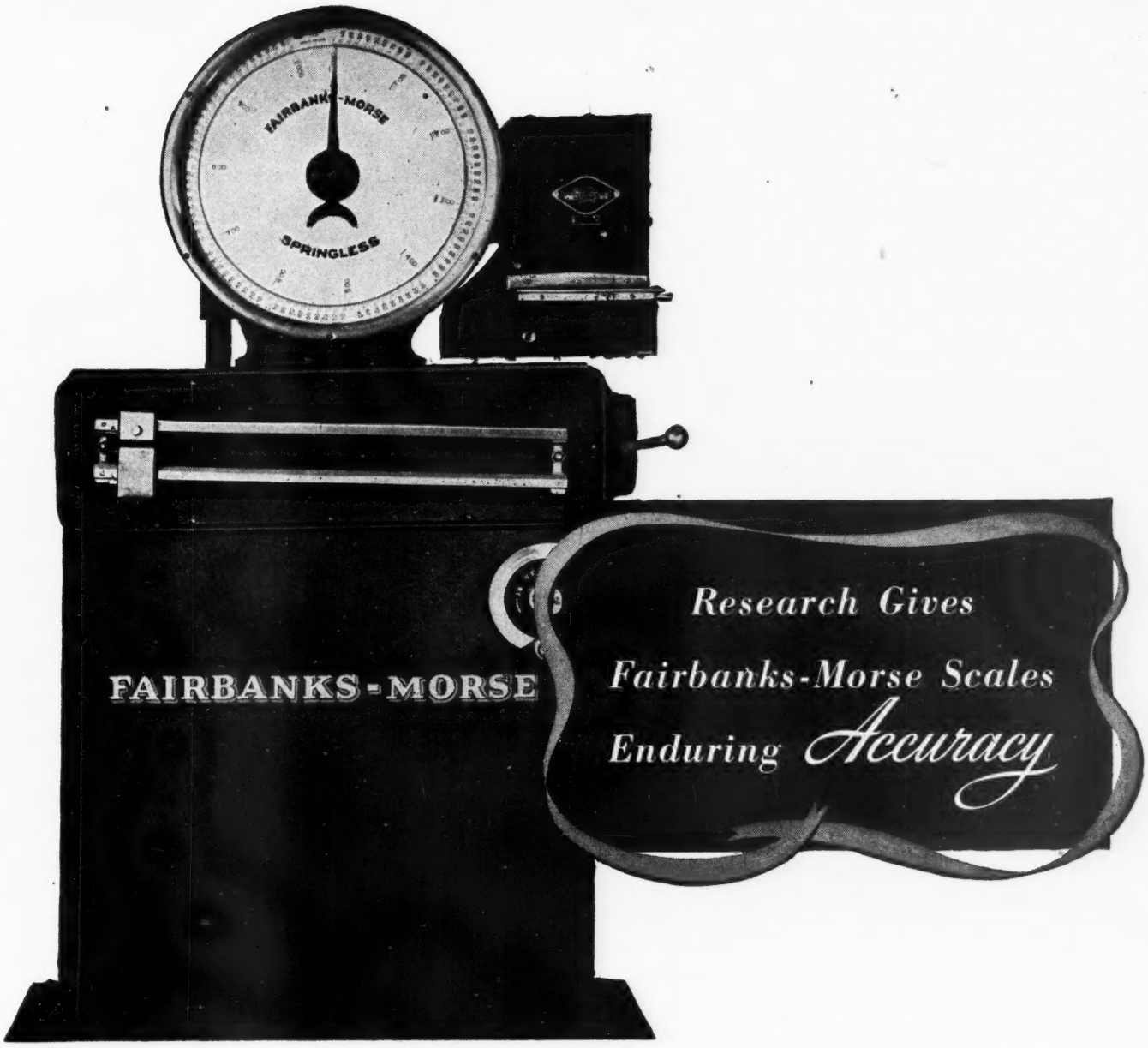
John H. Nair, former assistant director of research of Continental Foods Corp. (Lipton Tea Co.), Hoboken, N. J., has been made director of research, succeeding Stephen L. Galvin.

Capt. Charles Norton, who served in Brisbane, Australia, under Maj. Carl R. Fellers in subsistence testing, has returned to his post in the research department of Continental Can Co. However, he soon will return to Melbourne to start a customer service department and laboratory for Southern Can Co., a Continental affiliate.

Richard E. Ryberg has been appointed to the technical staff of the food service division, American Maize-Products Co. He formerly was an instructor of food technology at the American Institute of Baking.

J. H. Reddy, vice-president of Lovell and Covel, Cambridge, Mass., has succeeded Ted Stempfel as chairman of the Council on Candy's steering committee, National Confectioners' Association.

Robert S. Scull, who has been in England and Germany in a civilian capacity for FEA since June, has returned to



Fairbanks-Morse Scales have earned their world-wide reputation for enduring accuracy through constant research to improve even the most minute parts—through research in the selection of the most enduring materials—through research in design to perfect each part. This has been the Fairbanks-Morse policy for over a hundred years, and it continues to be the Fairbanks-Morse policy today.

Skilled craftsmen produce these parts with the aid of modern machines. Trained assemblers put them together. A weighing machine so constructed performs accurately day after day, year after year.

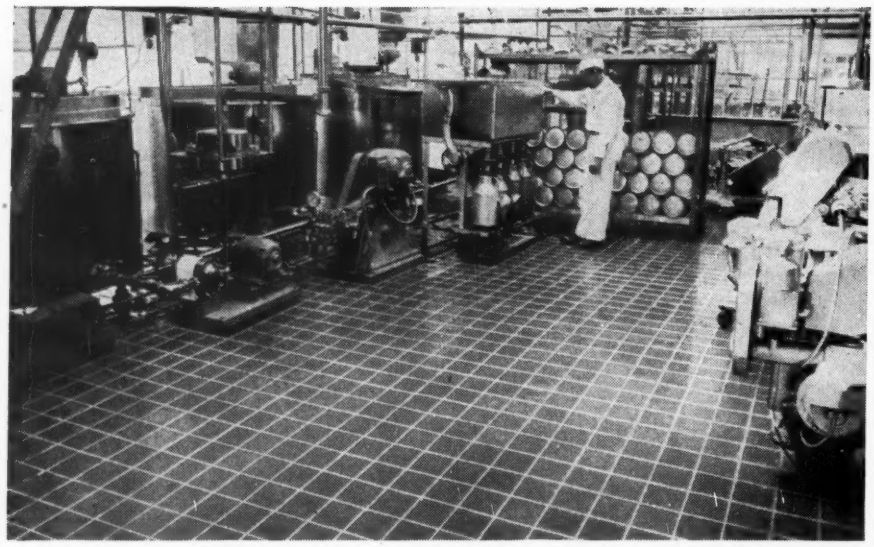
Fairbanks, Morse & Co., Fairbanks-Morse Building, Chicago 5, Illinois.

Fairbanks-Morse

A name worth remembering

Diesel Locomotives • Diesel Engines
Scales • Motors • Pumps • Generators
Magnetos • Stokers • Railroad Motor Cars and Standpipes • Farm Equipment

ACID-PROOF, WEAR-PROOF
TROUBLE-FREE FLOORS
— for —
Food Processing Plants

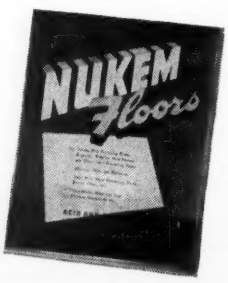


NUKEM Acid-proof Floors eliminate repairs and maintenance expense wherever floors are subject to acids, alkalies or solvents. Hundreds of plants are enjoying the trouble-free service and long life which is characteristic of NUKEM construction.

Regardless of what the conditions are in your plant, one of the various types of NUKEM floor construction will solve your problem. NUKEM floors are immune to all commercial acids, including acetic and lactic acid, vegetable and fruit juices, sugars, etc., as well as alkalies and solvents. They are leak-proof, wear-proof and attractive. The first cost of a NUKEM floor is the last cost.

Ask to have a NUKEM engineer go over your problem with you. There is no obligation. He will submit recommendations and an estimate of cost. If you decide to install a NUKEM floor, we will furnish all materials, supervision and labor. Or if you prefer, your own men can do the work, and we will furnish materials and supervision.

Write for booklet describing NUKEM products and construction in detail.



NUKEM Products CORPORATION
108 COLGATE AVENUE, BUFFALO 20, N. Y.

his work as vice-president in charge of research and development at Burnham and Morrill, Portland, Me.

Charles C. Teague recently was re-elected president of the California Fruit Growers Exchange for the 26th year.

Dr. B. J. Vos, Jr., has become acting chief of the pharmacology division of the Food and Drug Administration, a position left vacant by the death of Dr. H. O. Calvery.

Donald G. Wilson has returned to his position as company treasurer and manager of the sardine department of B. H. Wilson Fisheries, Eastport, Me.

DEATHS

E. Leidy Brendlinger, secretary of the Flavoring Extract Manufacturers' Association, Norristown, Pa., recently.

Charles A. Catt, 48, superintendent of production, Kroger Grocery and Baking Co., Cleveland, recently.

Morrell H. Hayman, 57, St. Louis branch manager for Stein, Hall and Co., Inc., November 29, Webster Groves, Mo.

William P. Jackson, 64, co-ordination manager of sales and advertising for Lever Brothers Co., Cambridge, Mass., November 20, Watertown, Mass.

Gertrude Speiden Kissell, 37, head of National Canners' Association Research Laboratory, Washington, November 27.

Thomas J. Maney, research professor of pomology, Iowa State College, recently at Rochester, Minn.

Ethel V. Mars, 61, head of Mars, Inc., Chicago, December 25, La Jolla, Calif.

Emil Muller, manager of production, Fritzsche Brothers, Inc., New York, December 4, Great Neck, N. Y.

Raymond J. Rooney, 50, president Food Materials Corp., Chicago, November 18.

C. J. Root, president of Florida Coca Cola Bottling Co. and a director of Coca Cola Co. and Owens Illinois Glass Co., November 20.

Robert Waugh, technical department, Fritzsche Brothers, Inc., New York, December 2.

Maurice R. Whitehead, 68, former superintendent of Pacific Fruit Express, northwest district, December 7, Portland, Ore.

Stanley H. Zimmerman, 55, manager of the Post Products Division, General Foods Corp., Battle Creek, November 27.

A Good Package attracts attention!

There are two qualities in a Royal FLAV-O-TAINER package that make it stand out from the rest. One is *unusual eye-appeal*, particularly true when it has been created by Royal designers. The other is *unusual protection*, particularly important with a perishable product. FLAV-O-TAINER is a patented duplex bag, heat-sealed on all seams, that protects the contents from the destructive effects of air, moisture, grease, and odors.

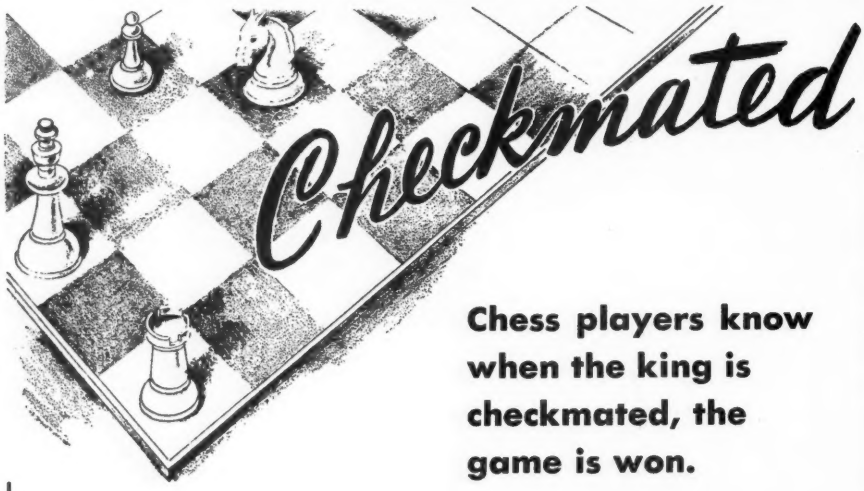
We are making FLAV-O-TAINERS lined with Pliofilm, Cellophane and Dioflex *now* (Dioflex is moisture-proof coated glassine laminated to itself).

Other Royalflex films such as Selloflex (Cellophane laminated to itself or to other material) Lumiflex (aluminum foil laminated to other material), and Pliofflex (Pliofilm laminated to itself or to other material) will be available soon.

"FLAV-O-TAINER" THE COOPERATIVE PACKAGE HELPS SELL YOUR PRODUCT

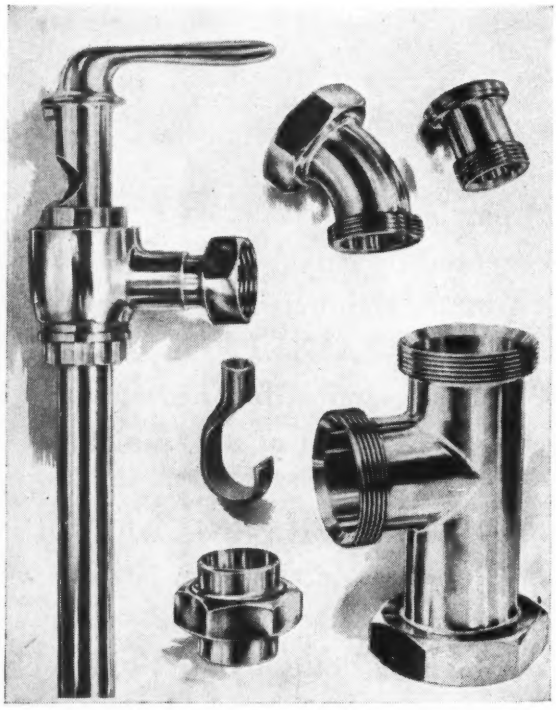
THOMAS M. ROYAL & COMPANY • *Philadelphia 20*

BOSTON • CHICAGO • SAN FRANCISCO • BEAUMONT • ATLANTA • PITTSBURGH • NEW ORLEANS
DENVER • SEATTLE • NEW YORK • ST. LOUIS • DAYTON • DETROIT • SYRACUSE • BRYN MAWR



Chess players know when the king is checkmated, the game is won.

Dairymen who have had experience with 18-8 Tri-Clover Stainless Steel and Trialloy Fittings know bacteria hide-outs are a thing of the past, as every part is easily reached by sterilizing and cleaning compounds.



THE *Complete Line*

1. Trialloy (Cupro Nickel) Sanitary Fittings
2. Fabricated Stainless Steel Sanitary Fittings
3. Pumps (Centrifugal—non-agitating) Trialloy and Stainless Steel
4. Custom Fabrication
5. Sediment Testers
6. Line Filters

Standardized Accuracy and Interchangeability are YOUR Tri-Clover Guarantee.

A few of more than 40 sizes from 1 to 4 in.

Try TRI-CLOVER

SANITARY FITTINGS VALVES *and* PUMPS

TRI-CLOVER MACHINE CO.

2814 60th STREET KENOSHA, WISCONSIN

ASSOCIATED INDUSTRIES

Allis-Chalmers, Milwaukee, has made known the appointment of J. L. Singleton as manager of the 60 district offices of the Allis-Chalmers general machinery division's sales department. Mr. Singleton formerly was assistant manager of the steam turbine department.

Ball Brothers, Muncie, Ind., will build a $1,000,000 plant in El Monte, Calif., early in 1946. The new unit will be used for the manufacture of fruit jars and various glass containers. Hugh Crawford will be the company's Pacific Coast manager.

Stephen A. Brooks and seven associates have organized the Brooks Rotameter Co., a corporation capitalized at $100,000. A factory has been acquired at Lansdale, Pa., and manufacture has started on all types of rotameters for flow rate measurement and control.

Creamery Package Manufacturing Co. has purchased the entire property of the Southern Dairy Supply Co., Houston, Tex. Manager of the new branch will be Ralph Nultemeier, who previously has been attached to the Dallas branch as sales manager.

Owens-Illinois Glass Co. has announced the appointment of Kenneth A. Hamel as publicity manager for the Glass Container Division.

Phillips Petroleum Co., Bartlesville, Okla., has regained the services of Miller W. Conn as manager of the Perco Division, chemical products department. Mr. Conn has been on active duty with the Navy for more than two years.

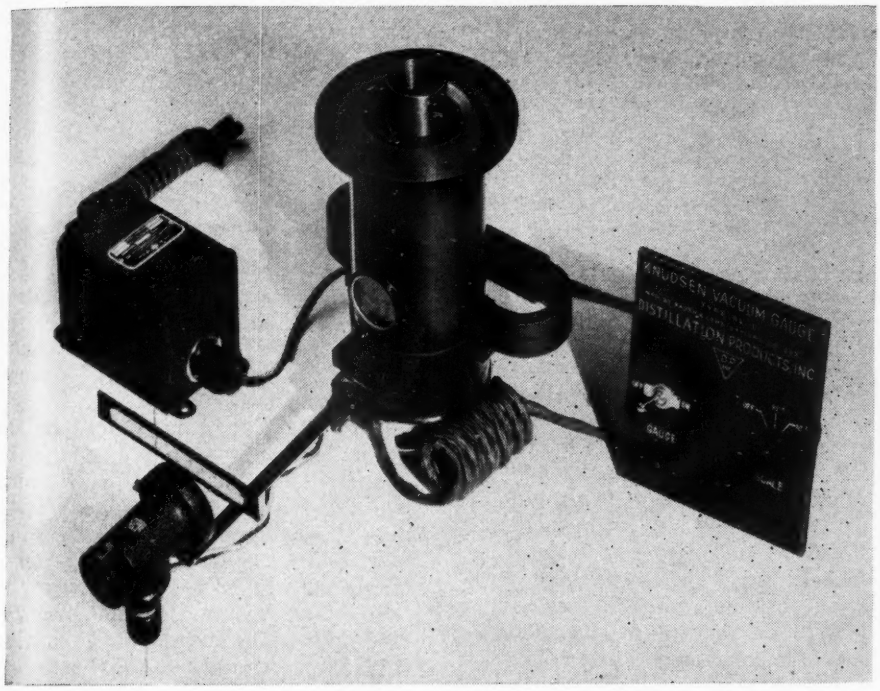
H. K. Porter Co., Inc., has announced the purchase of the Fort Pitt Spring Co., Pittsburgh, manufacturer of coil and elliptical springs. The new acquisition will be known as the Fort Pitt Spring Division of H. K. Porter Co., Inc. Henry Miller will continue as general manager.

Thatcher Manufacturing Co., Elmira, N. Y., has announced the appointment of John B. Miller as district manager for New England with headquarters in Boston. Mr. Miller, who will replace Edward D. Tipton, formerly was sales manager of the beer and beverage division.

Nathaniel Warshaw, consulting engineer in materials handling, is now head of the materials handling division of Market Forge Co., Everett, Mass.

York Corporation has announced the election of John R. Hertzler as vice-president. Prior to his recent service in the Navy, Mr. Hertzler was general sales manager of the York Corporation.

FOOD EQUIPMENT NEWS



Improved Knudsen gauge.

Vacuum Gage

DISTILLATION PRODUCTS, INC., Rochester, N. Y., announces an improved Knudsen gage which offers continuous reading of low pressures, whether or not a vibration-free support is available. An arrangement of damping magnets is said to eliminate the necessity for a rigid support. This overcomes all the mechanical disadvantages which heretofore have eliminated the use of this gage principle in high vacuum installations.

Carton Filler

FREE-FLOWING frozen foods may be filled into containers at the rate of 100 cartons per minute by a machine built by Food Machinery Corp., Hoopeston, Ill. This equipment automatically opens, fills and closes the carton. The "fill" is within a maximum tolerance of ¼ oz. per carton, in any size of carton up to 1 lb.

The sequence of operation follows: Cartons are loaded into magazines, flat-folded, as they are received from the carton company. They are ejected mechanically into an automatic opener that sets them up, ready for filling. Then they are fed along a conveyor into the filling unit and registered under rotating filling stations, where the frozen food is discharged into the containers from adjustable volumetric measuring pockets. While under the filling stations, the cartons are vibrated to obtain a full weight and an even pack. Final inspection or check weighing is permitted by extra conveyor space when so ordered.

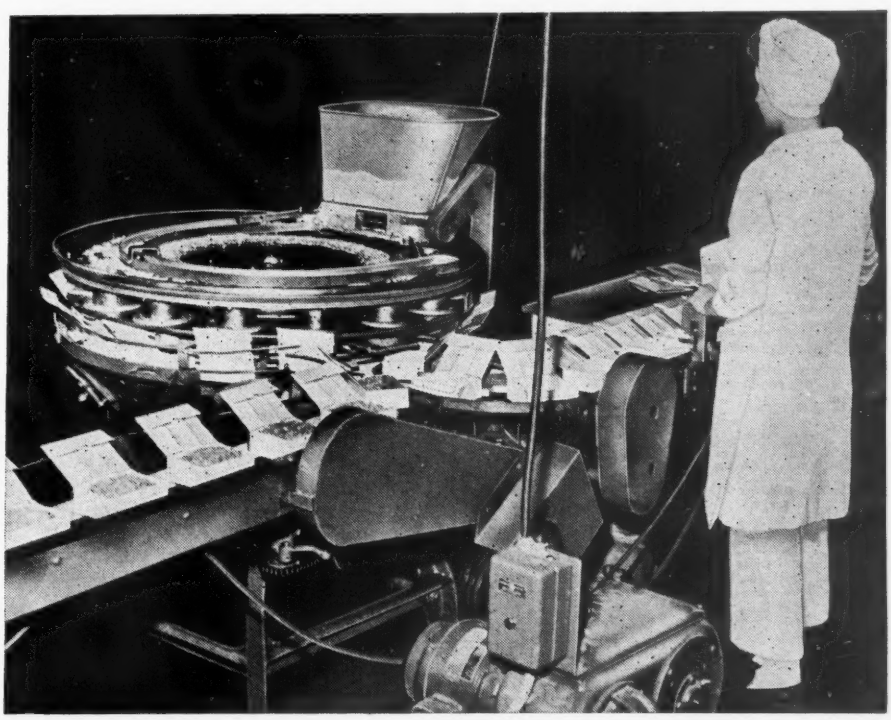
After filling, the cartons are carried through a device which automatically closes them, forms them into proper shape and delivers them to the overwrapping machine or final operation conveyor.

Portable Pyrometer

QUICK, accurate and direct measurement of solutions heated as high as 1200 deg. F. is now possible with a portable pyrometer manufactured by Roller-Smith Co., Bethlehem, Pa. This instrument may be inserted into any heated food solution or may be used to measure the temperature of ovens or atmospheres. It is built to withstand normal jars, vibrations and other conditions incident to shipping, storage and service. Parts are interchangeable.

Light Truck

A LIGHT TRUCK of all-welded tubular construction with mechanical rubber tires and oilless bronze bearings is announced by Burdett Oxygen Co., 3345 Lakeside Ave., Cleveland, Ohio. It handles all sizes of gas cylinders, barrels, boxes and crates. It weighs 12 lb. and has a 300-lb. capacity.



Free-flowing foods carton filler.

Basco-TEX PLASTIC APRONS!

Will Not Crack or Peel

WATER-PROOF, ALKALI-PROOF, STAIN-PROOF, ACID-RESISTANT, OIL-RESISTANT

NO LAUNDERING
Save their cost over and over again!

TOPMOST PROTECTION
Far greater safeguard to clothing than ordinary aprons!

AMAZING STRENGTH
Plus lightness in weight for utmost wearing comfort!

4 COLORS 4 SIZES

PRICES — SIZES — COLORS

GRAY
27 x 36...$8.40 per doz.
30 x 36... 9.78 per doz.
36 x 40...11.90 per doz.
36 x 44...12.60 per doz.

Full Length Sleeves $9.66 per dozen pair

Leggings, Hip Length $11.90 per dozen pair

BLACK
27 x 36...$8.40 per doz.
30 x 36... 9.78 per doz.
36 x 40...11.90 per doz.
36 x 44...12.60 per doz.

Full Length Sleeves $9.66 per dozen pair

Leggings, Hip Length $11.90 per dozen pair

ALL WHITE
27 x 36...$6.88 per doz.
36 x 36... 7.65 per doz.
36 x 40... 9.35 per doz.
36 x 44...10.18 per doz.

Full Length Sleeves $7.15 per dozen pair

HEAVY DOUBLE COATED MAROON NEOPRENE
27 x 36..$10.61 per doz.
30 x 36.. 12.60 per doz.
36 x 40.. 16.50 per doz.
36 x 44.. 18.45 per doz.

Full Length Sleeves $12.90 per dozen pair

Leggings, Hip Length $23.50 per dozen pair

All Prices F.O.B. Chicago. Furnish best priority. Minimum order 1 dozen.

ORDER BY MAIL OR PHONE TODAY
Free Sample Swatch on Request

ASSOCIATED BAG & APRON CO.
218 West Ontario Street, Chicago 10, Ill.
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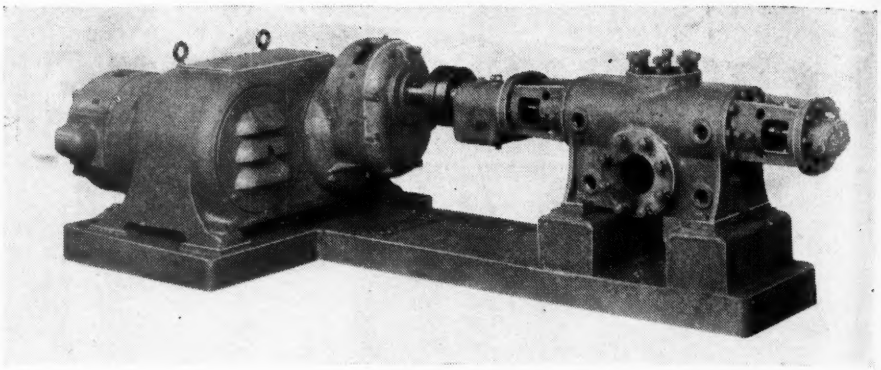


Quadruplicate screw pump

Screw Pump

IMPROVEMENTS in balanced quadruplicate screw pumps have been announced by Quimby Pump Co., a division of H. K. Porter Co., Pittsburgh 22, Pa. Separate pedestals with the three-point alignment problem and spacing washers are eliminated, which is said to provide free expansion of shafts for wide changes in temperatures. Precision, preloaded, antifriction bearings permit close running clearance between the body bores and the screws. This new construction can be provided on all existing pumps without disturbing present pipe connections or location of the motor.

Butter Wrapper and Wrapping Machine

DEVELOPMENT of a waxed wrapper and of a machine for its application have together resulted in what is claimed to be the first commercial airtight butter package.

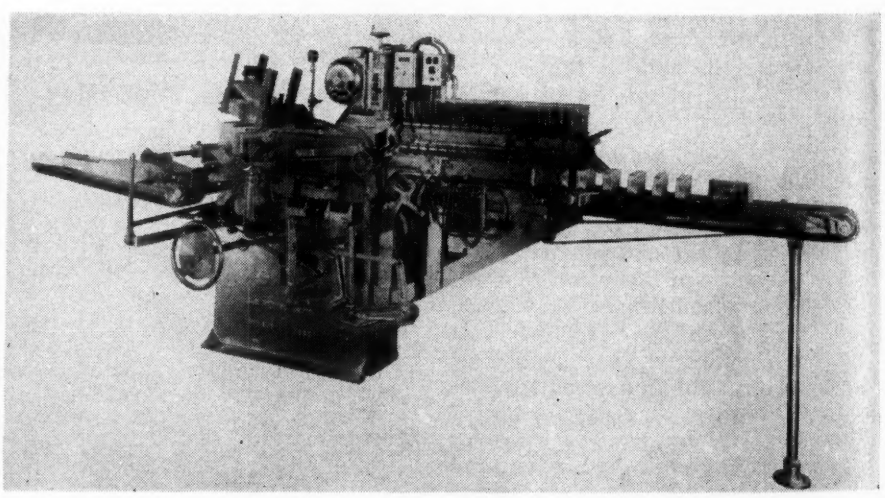
The wrapper consists of a printed waxed kraft sheet with an inner reinforcing strip of heavier waxed kraft through the center. It is supplied printed and scored for folding by Western Waxed Paper Co., Los Angeles, Calif. The combination gives sufficient stiffness to hold the shape of the sealed package, with end-sealing extensions light enough to fold and seal readily.

Wrapper blanks are placed on the wrapping and sealing machine by suction in pockets of a forming wheel. Parchment-wrapped ¼-lb. prints arranged in the "California" way, with the four quarters in a single layer, are fed by conveyor to the pockets, folding of the end and side flaps being accomplished during the further travel of the wheel.

The sealer, manufactured by F. B. Redington Co., 112 S. Sangamon St., Chicago, has both heating and chilling sections.

Folded packages, with the side seam down, are moved from a transfer conveyor through the sealer by plates on an overhead belt, so that each unit is in an individual pocket, protected on both flat faces from the sealing heat. Packages are discharged cooled, ready for casing.

The advantages in the sealed package are several. The wrapper is cheaper than a carton, while at the same time it presents a neater and more finished appearance. It is easy



Butter wrapping and sealing machine.

S-T-R-E-T-C-H-I-N-G A BOXCAR

IN THE EARLY STAGES OF THE WAR, a serious shortage of shipping space threatened supply lines to Europe and the Pacific. Aiding in the urgent search for a solution to the problem, The Cambridge Tile Manufacturing Company, Cincinnati, successfully completed an experiment in compressing three carloads of dried whole egg powder and loading them into a single boxcar.

Presses that had been used to compress clay into Suntile were quickly converted into food compression equipment through the use of new dies designed and built in Cambridge Tile's own shops. Facilities were rapidly expanded to meet the ever increasing demand of the Armed Service Forces for compressed emergency rations. But the conversion created handling problems that throttled production and prevented full utilization of the extra shipping space made available by the new food compression method.

So Towmotor engineers were called in to install a modern materials handling system. 100-pound bags of dried food powders were loaded on pallets in the receiving room and fed to the production line in a continuous, controlled stream. The finished cakes of compressed food were packed into shipping cartons, assembled into large unit loads, and moved directly into the boxcars by one girl and a Towmotor. Work schedules were accurately timed to provide maximum output per man and machine. Closer inventory control eliminated delays and tie-ups. Production speed was increased to machine capacity, freed from the limitations imposed by slow handling methods. Most important, Towmotor made possible immediate and full utilization of every foot of shipping space.

The results achieved at Cambridge Tile are typical of Towmotor installations throughout industry. The know-how and experience that contributed numerous opportunities to increase productive output also enabled Cambridge Tile to effect savings of $1,000 a month in handling costs alone. The Towmotor Materials Handling Analysis Guide, a product of know-how and experience, will greatly simplify your handling problem; send for a copy today. Towmotor Corporation, 1222 East 152nd Street, Cleveland 10, Ohio.

TAKE IT UP WITH

TOWMOTOR

THE ONE-MAN-GANG

BUMP PUMPS

WILL DO YOUR PUMPING JOB *Better!*

here's why

FIG. 1

FIG. 2

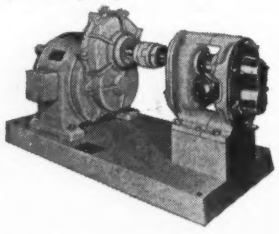
FIG. 3

FIG. 4

Note the principle of operation illustrated and you will See why Bump Pumps have a low maintenance cost. The internal seals do not revolve and there is no contamination of the fluid being pumped, as the bearings are entirely separate from the pumping chamber. There are no grease cups and no internal threads — only 2 moving parts. Bump Sanitary Pumps are easy to clean and easy to maintain.

As one food processing company that has been using a large number of Bump Pumps in operation for years says: "We use Bump Pumps because, in our opinion, they do a better job at a lower total cost to us than any other pump now offered on the market".

Bump Sanitary Pumps are positive action, self-priming under head pressures, and deliver a constant volume per revolution, regardless of speed or pressure. They can be operated at slow speed without churning action, vibration or agitation within the pump.



Available in capacities from 1/2 to 300 GPM. Illustrated is Bump Sanitary Direct Drive model, one of the models in the complete line. Fully illustrated catalog upon request.

The BUMP PUMP CO.
LA CROSSE * WISCONSIN

to open. Also, the butter is protected from loss of moisture and from picking up extraneous odors—both definite quality advantages. Further, the wrapper, clinging close to the product, minimizes the amount of entrapped air initially present as well and prevents access of air at any time after packaging.

Silicone Greases

Two silicone greases, serviceable in ball bearings operating at speeds up to 10,000 r.p.m., are announced by Dow Corning Corp., P. O. Box 592, Midland, Mich. They are said to be subject to bleeding of less than 2 percent after 16 hours at 230 deg. F. One of them, DC 33, is effective over a temperature range of —94 deg. F. to 300 deg. F. The other, DC 44, is serviceable at temperatures ranging from —4 deg. F. to 345 deg. F. Their low volatility and their very slight tendency to bleed recommend them for the sealed-in lubrication of ball bearings and for lubrication of bearings operating at high or low temperatures.

They are light brown in color and are compounded with metallic soaps selected for their heat stability.

Automatic Cutoff Valve

AN automatic liquid cut-off valve designed for mounting on the outlet line of a storage tank has been placed on the market by Johnston & Jennings Co., Cleveland 14, Ohio. Liquid from the tank flows into the valve and passes upward through a port, supplying pressure against a lower diaphragm and raising the valve to permit liquid to pass through and out. This pressure on the lower diaphragm is reduced as the level of the liquid in the tank drops. So the valve, with its weighted preloading chamber, closes gradually and cuts off the flow entirely when the liquid in the tank reaches a predetermined level.

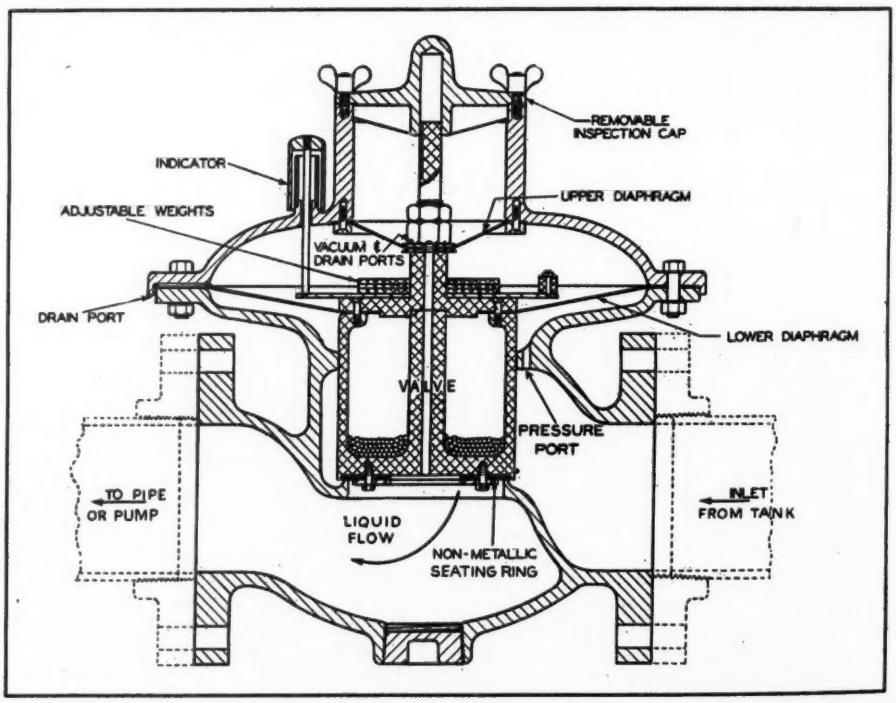
The hollow stem of the valve holds in balance the vacuum pull between the upper diaphragm and the under side of the valve, so that refilling the tank, opens the valve, automatically permitting liquid to flow through again.

Weighting of the preloading chamber can be varied over a wide range for various tank levels and operating conditions.

Temperature Regulator

A SELF-CONTAINED, spring-loaded, internal-pilot, piston-operated temperature regulator for steam service has been announced by Leslie Co., 89 Delafield Ave., Lyndhurst, N. J. A prominent feature of the regulator is Duo-Matic control, whereby both accurate temperature regulation and pressure control are said to be obtained simultaneously with a single regulator.

The controller has a wide-range thermostatic element with a 100 deg. F. adjustable temperature range. It is single-seated for positive dead-end control. Equipped with metal diaphragms, it has no bellows or packing glands.



Automatic liquid cut-off valve.

CARTONS THAT SPEAK OF QUALITY AND VALUE!

Your carton must do a selling job today. On dealers' shelves and counters it must speak of quality and value if it is to move at the moment of decision. That's why your product should be packaged in A.C.M. Clay Coated Cartons. A.C.M. is the world's finest, most uniform Clay Coated Board. Made by an exclusive, continuous process, with a pure white, velvet-smooth surface that gives lustre, brilliance and perfect reproduction to any design in either letterpress or lithography.

WHY A.C.M. CARTONS ARE BEST:

Whiter board—
velvet-smooth surface—more rigid—
tougher—better folding qualities—
greater lustre and brilliance—
perfect reproduction in either letterpress or lithography.

AMERICAN COATING MILLS, INC.
Main Offices and Plants—Elkhart, Indiana.
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271 Madison Ave., New York City.
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The Secret is in the SURFACE

ACM

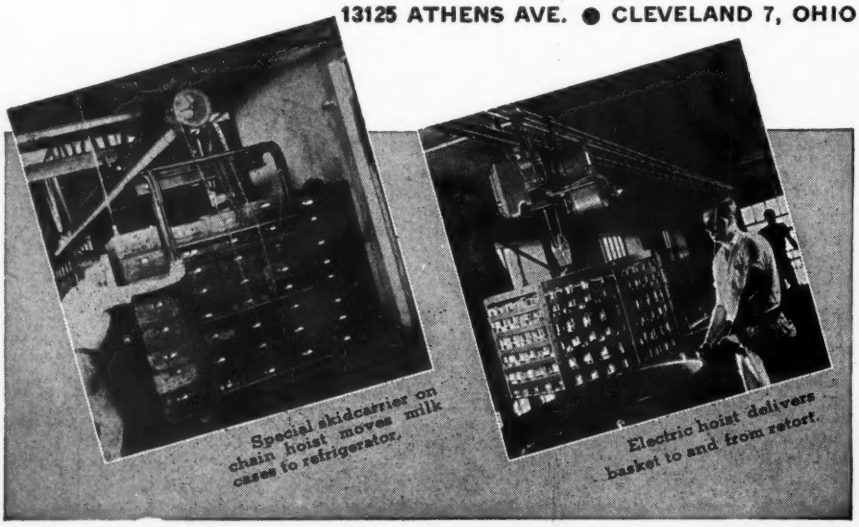
AMERICAN COATING MILLS

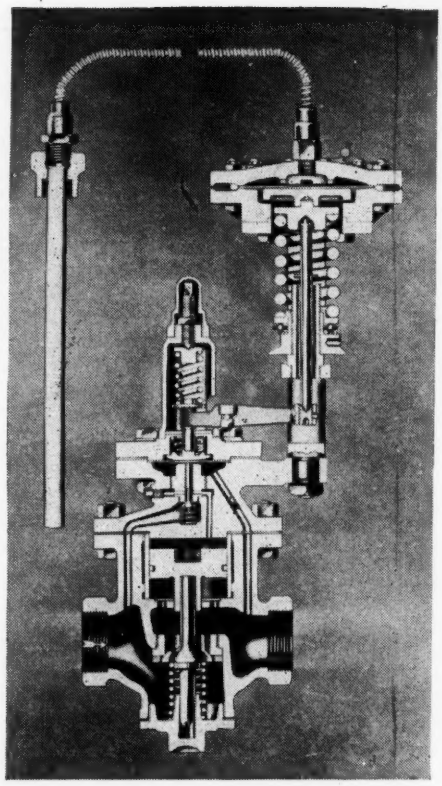
A.C.M. CLAY COATED CARTONS AND CARTON BOARD

AMERICAN MONORAIL Overhead Handling Systems have a universal range of uses in the food processing industry. From receiving room to shipping room there is American MonoRail equipment that does the job of handling better, quicker and more economically. You can speed up production, eliminate all manual handling and rehandling, move materials on quick accurate schedules, and do it at a great savings in cost. Let an American MonoRail Engineer show you "all round savings" with this equipment—write today!

THE AMERICAN MONORAIL COMPANY

13125 ATHENS AVE. ● CLEVELAND 7, OHIO


Special skidcarrier on chain hoist moves milk cases to refrigerator.
Electric hoist delivers basket to and from retort.



Duo-Matic control temperature regulator.

A vapor-filled thermostatic element acting through the upper diaphragm and lever opposes a pressure limit spring and determines the steam pressure delivered by the regulator. A temperature drop of 1 deg. F. at the bulb reduces the vapor pressure, allowing the limit spring to open the controlling valve and deliver increased steam pressure.

Outlet steam pressure is always directly proportional to the change in temperature at the bulb, and this pressure is automatically maintained regardless of the volume of steam used by heater or variations in supply pressure.

All wearing parts are renewable. Complete interchangeability allows overhauling without removal from the pipe line. Corrosion and wear resistance is obtained with the use of hardened stainless steel wearing parts, vital parts being hardened to at least 500 Brinell.

Specific Gravity Indicator

CONTINUOUS specific gravity reading is possible with an indicator announced by Schutte & Koerting Co., Philadelphia 22, Pa. This unit is said to eliminate the need of intermittent sampling methods. Flow to the indicator is regulated by a valve. Liquid rises in the heavy-walled glass tube to a height determined by outlet pipes, overflows and returns to the process. Specific gravity is indicated on a standard hydrometer within the

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that's the kind the public wants!

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2. convenience
3. brand emphasis
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Your product must answer the consumer and retailer demand for CONVENIENCE! Convenience that means less spoilage, better display, and easier handling to the retailer . . . Convenience that offers quick identification, clearer directions for preparation, more compact storage to the consumer . . . In short, a carefully planned and designed package. Consult Milprint today for a package that will spell convenience to the public—and better sales for you!

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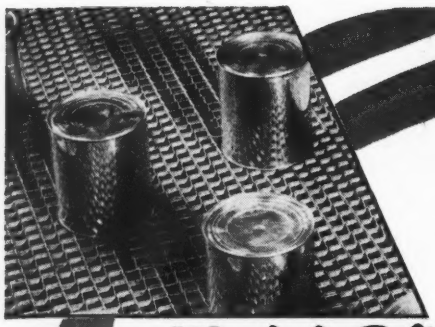
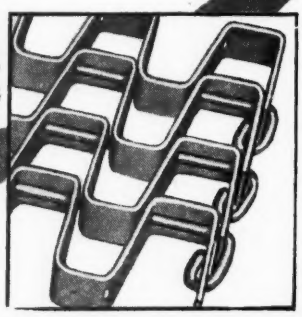


MODERNIZE CONVEYING

with LA PORTE FLEXIBLE STEEL CONVEYOR BELTING



Engineered to today's processes, this modern steel belting can be used in all of the newest methods of canning, dehydrating and freezing. Steam, acids and extreme temperatures do not harm it. Steel mesh feature allows circulation of air and liquids around products in process; also facilitates cleaning and sterilizing with steam gun or hot water. La Porte belting will not stretch, weave, creep, nor jump. Its rugged construction assures long, economical service and low maintenance costs. No special dressing or belt lacers needed to keep it at peak efficiency.

Ask your Supplier today. Available in any length and practically any width.

LA PORTE MAT & MFG. CO.
BOX 124 LA PORTE, INDIANA

Paksure FOOD PACKAGINGS

ATTRACTIVE, PROTECTIVE PACKAGINGS...FOR ALL FOODS

We are designers and manufacturers of distinctive, *original* food packagings to your special order or available from stock. New packagings, including wrappings, bags and envelopes utilizing cardboard, plain or printed glassine, cellophane, laminated papers etc., will offer your products prestige and sales appeal.

We can package *anything* you make, including frozen foods . . . why not send us your packaging problems?

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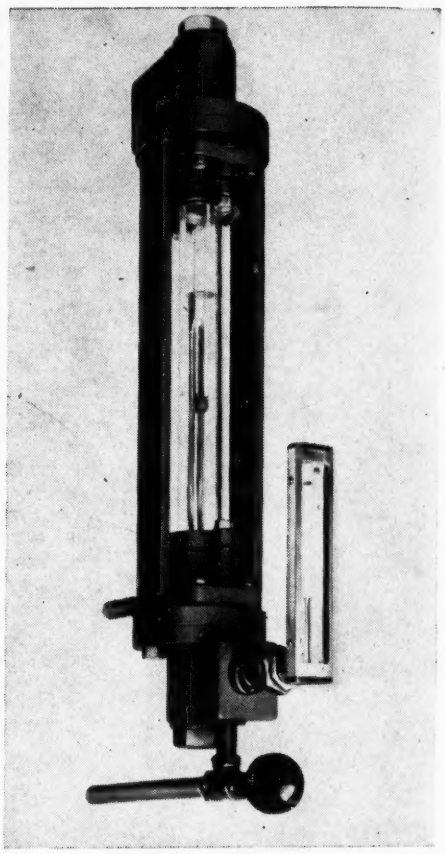
777 Public Ledger Bldg.
Philadelphia 6, Pa.



Continuous specific gravity indicator

tube. An integrally mounted thermometer provides for convenient temperature when the hydrometer is read.

The indicator is said to be readily installed in new or existing pipe lines. Both inside and outside cleaning can be accomplished without disturbing pipe connections. Packing glands are adjusted by cap screws and there are no large threads to corrode and freeze.

While normally supplied in bronze, these units may be obtained in any alloy when special conditions require them and are so specified by customer.

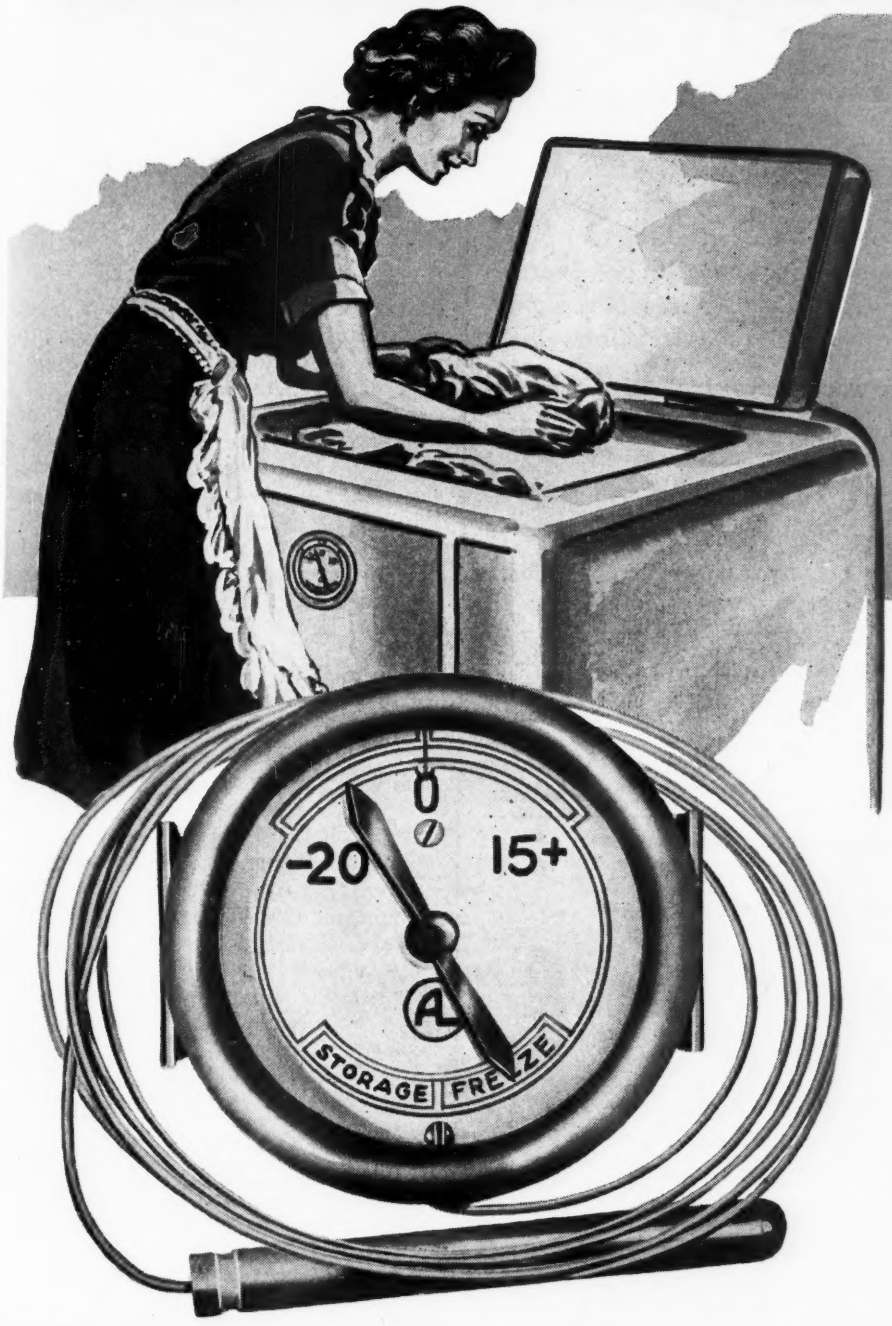
Ventilating Hose

REINFORCED, lightweight, large-diameter ducts which can be compressed into small space for transportation and yet stay open around sharp bends are manufactured by the American Ventilating Hose Co., 15 Park Row, New York 7. The ducts are available in diameters of 5 to 24 in. Compression for packing is 6 to 1 overall.

It is particularly well-suited for use in tank ventilators and portable air conditioning and cooling units. It is also adaptable for the control of fumes and light dust in process work.

Its 2½-ft. sectional construction allows the assembly of any desired length. The sections are readily

AUTO-LITE DIAL THERMOMETERS



. . . ASSURE PROTECTION FOR FROZEN FOODS

Home freezer purchasers appreciate the assurance of safety that is provided by AUTO-LITE Dial Thermometers. More than an accessory, AUTO-LITE Indicating Thermometers on your attractive freezer models complete the modern service of your equipment. You make the storage of frozen foods safe beyond doubt, when you incorporate AUTO-LITE Indicating Thermometers. These instruments have no delicate parts liable to wear or to require adjustment. Operating parts, including capillary tubing and bulb, are corrosion resistant. Your trademark can be placed on the thermometer dial, or we may be able to incorporate the instrument in your trademark. Ask us for illustrations, sizes and prices of AUTO-LITE thermometers for freezer and cold-holding cabinets.

In addition to a wide range of thermometers and gauges, AUTO-LITE specializes in the production of instruments of special design for use as a standard part of manufacturers' equipment. Details on request.

THE ELECTRIC AUTO-LITE COMPANY
INSTRUMENT AND GAUGE DIVISION
CHRYSLER BUILDING, NEW YORK 17

AUTO-LITE *Indicating & Recording* THERMOMETERS

Short-Cut to Floor Cleanliness!

For your dirtiest floors, for the floors that are hardest to clean, get quick-action, thorough Metso. In food plants from coast to coast it cuts cleaning time, saves labor, insures floors that are free of grease, oil and dirt.

Metso works more efficiently because it saponifies both animal and vegetable fats, disperses solid dirt where mold and bacteria lurk.

Metso is a safe short-cut for floor cleaning. Specify it on your next order.

Philadelphia Quartz Co., Dept. D, 125 S. Third St., Phila. 6, Pa.
Sodium Metasilicate U. S. Pat. 1898707

metso *Cleaners*

LIQUIDOMETER
Tank Gauges

ALWAYS DEPENDABLE

FOR GAUGING LIQUIDS OF ALL KINDS

100% AUTOMATIC

APPROVED BY UNDERWRITERS' LABORATORIES

WRITE for COMPLETE DETAILS

"LIQUIDS WORTH STORING ARE WORTH MEASURING"

THE LIQUIDOMETER CORP.
38-14 SKILLMAN AVE., LONG ISLAND CITY, L.N.Y.

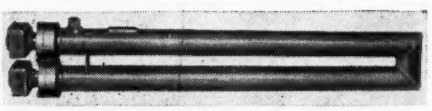
Lightweight ventilating hose.

coupled and uncoupled by hand. Special attachments for coupling to blowers or other air handling apparatus are provided.

The reinforcement consists of rings spaced from 2 to 5 in. apart, according to the diameter of the hose. These are firmly held in place around their entire circumference by the neoprene base compound which also covers the entire inside and outside surface of the hose. Sizes available are from 5 in. to 24 in. dia.

Heat Exchanger

THE Brown Fintube Co., Elyria, Ohio, has introduced a heat exchanger that employs electrical resistors as the heat source, the resistors being inside a length of standard Brownweld fintube. The current density of typical resistors now in use is 4 kw. per linear foot of fintube. But the rating on the outside surface is said to be only about 8 watts per square inch. This avoids high skin temperature that might cause carbonization of heat sensitive materials such as sugar, sirups, molasses or oils.

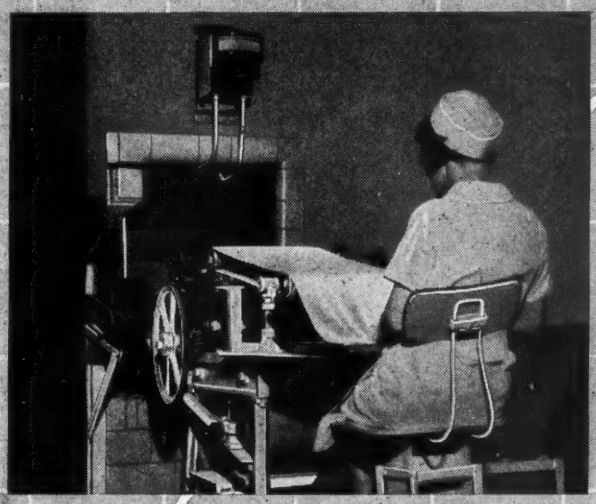


Electrical-resistor heat exchanger.

These units are said to be thoroughly practical for use in double-tube, bayonet, vertical immersion or other types of heat exchangers. They permit great flexibility as to the size and capacity of the equipment. Each installation is engineered to the individual, specific duty.

This type of electrical resistor heat exchanger is especially useful when steam is not available, or when it is desired to eliminate the auxiliary piping required when steam is used, or to heat the fluid to higher temperatures than can be reached with steam. The electrically operated units are said to insure 100 percent ab-

Dowtherm on the job!



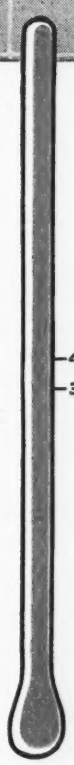
"French-frying" demands Dowtherm's disciplined heat!

Keeping high temperatures from running wild . . . that's *the* tough problem for many a heat processor! It confronted this big manufacturer eight years ago, in conjunction with "French-frying" a food product . . . a delicate operation, absolutely dependent upon careful temperature control.

His solution? A Dowtherm vapor heating unit . . . still in dependable operation today . . . still giving the even, "disciplined" heat (375°-400° F.) necessary to prevent ruining of batches from overheating or underheating. One of the company officials says this about Dowtherm:

> "*We put it in because it was the only process which would give us the control in our cooking oil that we required. Since that time, we have been more than pleased with its operation; and if and when additional expansion on this particular unit is contemplated, it most certainly will be Dowtherm heated.*"

Dowtherm is handling difficult jobs like this for many industries. Hundreds of users depend on Dowtherm's precise, low-pressure operation for greater product uniformity . . . reduced upkeep costs . . . increased safety in high-temperature processing up to 725° F. Check Dowtherm against *your* heating problems! Dow will be glad to send you full details.



Dowtherm

The high-temperature low-pressure heat transfer medium

DOW

CHEMICALS INDISPENSABLE TO INDUSTRY

THE DOW CHEMICAL COMPANY, MIDLAND, MICHIGAN

New York • Boston • Philadelphia • Washington • Cleveland • Detroit
Chicago • St. Louis • Houston • San Francisco • Los Angeles • Seattle

Greater germ-killing power yet absolutely SAFE!

that's

ROCCAL
BRAND
Sanitizing Agent

Kills bacteria . . . inhibits growth of molds, slimes and algae

When you buy your first bottle of ROCCAL, you will have taken a great step forward in solving your sanitization problem. ROCCAL is a powerful germ killer . . . much more potent than the germicides now in general use. Yet ROCCAL in recommended dilutions is non-poisonous, virtually odorless and tasteless. It is non-corrosive—will not injure equipment or irritate operator's hands. Contains no phenol, active chlorine or heavy metals.

ROCCAL is accepted by over one hundred and seventy-five public health authorities. It is sure, safe, economical. It is the germicide of tomorrow ready for your use today.

Free Sample and Literature on Request

COLD STORAGE AND LOCKER PLANTS
Reduces spoilage losses by keeping refrigerators and lockers sanitary. Does not affect odor or taste of food.

FOOD PROCESSING PLANTS
Keeps equipment and storage areas sanitary. Inhibits growth of molds, slime-formers and iron bacterial growth.

FISHERIES AND FISH PACKERS
For sanitizing interior storage areas of fishing boats, storage tanks in canneries, filet machines, shrimp deveiners, etc.

Industrial Division

WINTHROP CHEMICAL COMPANY, INC.
Dept. W-16, 170 Varick Street, New York 13, N. Y.

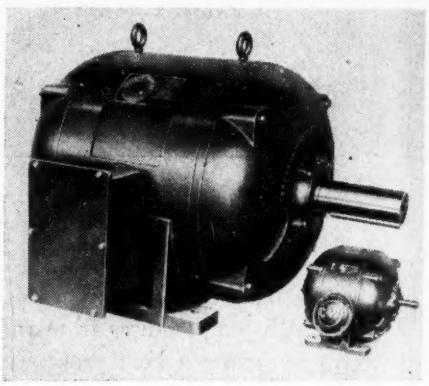
sorption of heat into the fluid being treated, and the temperatures can be controlled easily. The heaters are suitable not only for special applications, but for laboratory and power-plant services.

Protected Motors

WITH the addition of three new frame sizes, the Crocker Wheeler Division of Joshua Henry Iron Works, Ampere, N. J., now offers a complete line of alternating-current, squirrel-cage, protected type motors from 1 to 200 hp.

These are priced the same as the conventional open-type and are rated at 40 C. rise, full-load continuous duty, with a 15 percent service factor. Newly added larger sizes are basically the same construction with the addition of two shielded, air exhaust openings.

The manufacturer states that these motors provide full protection against dripping liquids and other foreign matter.



Large and small protected motors.

Dew-point Recorder

CLOSER control of the effects of water vapor in air or other gaseous mixtures is afforded by a dew-point recorder offered by Surface Combustion, Toledo 1, Ohio. The recorder is said to provide a virtually continuous record of humidity within a temperature range of from —70 deg. to +60 deg. F.

The instrument applies the principle of the dew-point cup. Its operation, therefore, is independent of the nature or composition of the gases making up the atmosphere.

In operation, a stream of the furnace gas, after filtering, is directed against the mirrored surface of the dew-point cup, while refrigerant is circulated within the cup. As the temperature of the refrigerant drops, which in turn decreases the temperature of the mirror, a film forms on the surface when the dew-point

a Triangle installation
for packaging cranberries.

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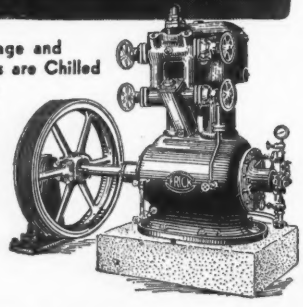

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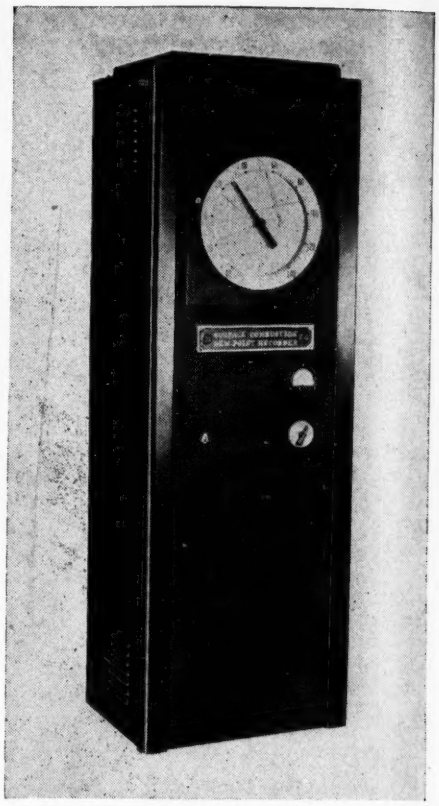

Dew-point recorder.

temperature of the gas is reached. As soon as the film forms on the mirror, it intercepts a light beam which has been directed upon the mirror and which is reflected on a photoelectric cell. When this takes place, the cell alters the flow of current. This, in turn, shuts off the flow of refrigerant around the mirror, at the same time making an instantaneous point record of that temperature.

This operation is repeated at three-minute intervals so that the series of recordings forms a virtually continuous line.

The sensitivity of the recorder can be adjusted by controls mounted through the front panel.

Steel Stools

STEEL STOOLS, available in five heights and 40 models, for a number of industrial applications, are being marketed by Lyon Metal Products, Inc., Aurora, Ill. The stools have been designed from a physiological standpoint to meet the various posture needs in industrial plants. A back support may be attached to all models.

Among the features included are all-welded, non-breakable construction, large 14-in. seats with rounded corners, a strong channel brace which provides a comfortable foot rest, and a pressed wood seat applied over steel for strength.

CATALOGS, BULLETINS

FOOD PLANT EQUIPMENT

Equipment — Tanks, evaporators, vacuum pans, condensers, heat exchangers and industrial piping, coils and bends are described and illustrated in a new bulletin issued by Artisan Metal Products, Inc., 211 Congress St., Boston 10, Mass. Both pilot-plant and production-size equipment are included. Of special interest in the pilot plant section is the rotating, self-cleaning strainer.

Lever Gate Valves—Lever-operated gate valves are shown in a 16-page bulletin issued by Everlasting Valve Co., 49 Fisk St., Jersey City 5, N. J. Complete descriptions of three standard types are given. Their quick action, straight-through flow and self-grinding of the sealing surfaces are described in detail.

Barometric Condensers — Countercurrent borometric condensers are described in a 4-page Bulletin No. 4609 published by Ross Heater & Mfg. Co., Inc., 1443 West Ave., Buffalo 13, N. Y. The subject is graphically presented with cross sectional drawings. The bulletin covers information on materials of construction, engineering data, tables of free air leakage and sizes of units made.

Canning Industry—Ayars Machine Co., Salem, N. J., has just published a 28-page catalog describing and illustrating a line of canning machinery. The line includes beet toppers, corn cleaners and shakers, exhausters, fillers of various types and for various products, siruping machines and fruit and tomato washers.

PLANT SUPPLIES

Spray Nozzles—A 14-page bulletin has just been published by Yarnall-Waring Co., Chestnut Hill, Philadelphia 18, Pa., relative to cooling and aerating water and other liquids. It describes and illustrates spray nozzles in a number of actual installations and, also gives construction suggestions and other engineering data.

Wire Screens and Bolts—Korb-Pettit Wire Fabrics & Iron Works, Inc., 1505-15 N. Mascher St., Philadelphia, Pa., have issued Catalogs Nos. 35, 30 and 40. Catalog No. 35 covers a variety of wire screens and wire cloth. The difference in meaning between terms "mesh" and "space" in wire cloth manufacture is described and illustrated. Catalog No. 30 covers various kinds of wire conveyor belts, showing balanced and unbalanced types, and belts with conventional weave with roller chain for guarding or preventing the customary stretch of wire belts. Catalog No. 40 describes the construction of industrial wire partitions, such as door guards, folding gates, and window guards. Inclosures of various kinds are also described.

Industrial Tires—A well-illustrated 38-page booklet in industrial tires has just been published by B. F. Goodrich Co., Arkon, Ohio. The booklet opens with a discussion of how industrial rubber tires give savings to users by reducing the hauling time, floor wear, noise, depreciation and breakage. Care and maintenance of industrial tires is featured in another section. Among subjects discussed are proper selection of tires. Ten pages are devoted to specifications for a partial list of power trucks and tractors by United States manufacturers, with the model, type, truck capacity and tire sizes listed.

Lecithin Uses—"18 Mistakes in the Use of Lecithin," published in the July and August Food Industries, has been made available in reprint form by W. A. Cleary Corp., New Brunswick, N. J. It outlines the principal functions of lecithin and then describes the more common mistakes made in its use in chocolate products, sirups, bakery products, fatty foods, mayonnaise, peanut butter, sherbets, ice cream mixes, gravies, cooking oils, and so forth. It also includes a "directions for use" table.

Wire Cloth—Cambridge Wire Cloth Co., Cambridge, Md., has issued a 4-page bulletin on wire cloth and fabricated parts for plate and frame presses.

Corrosion-resistant Materials—"Corrosion-Resistant Masonry Material and Construction Manual" is the name of a 52-page booklet released by U. S. Stoneware Co., Akron 9, Ohio. This informative booklet contains comprehensive engineering data and suggestions pertaining to materials and construction methods for tanks, towers, sumps, floors and other masonry construction.

Parts to Build Trucks—Casters and parts for trucks, racks, conveyors and platforms are described and illustrated in a bulletin issued by Market Forge Co., Everett 49, Mass.

Silicones—A 12-page catalog, featuring all of the silicone products now available, has been issued by Dow Corning Corp., Midland, Mich. The catalog describes the physical and chemical properties of these products. It suggests typical applications, such as waterproof insulating materials, lubricants for high and low tempera-

For accurate data on FLAVOR

an authoritative study of

—what flavor is

—how we smell, taste and "feel" it

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HERE is the first comprehensive, specialized treatment of flavor, gathering together material on every aspect of taste and color—its language, its chemistry, its psychology, and its commercial significance. Pioneering a new field in food technology, the book includes practical as well as theoretical material, and represents the most recent advances in flavor research.

FLAVOR

By E. C. Crocker

Arthur D. Little, Inc.
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McGraw-Hill Food Technology Series
172 pages, 5½ x 8½, $2.50

THE book contains a philosophy of flavor, and discussing in turn each of the complex sensory elements of tongue taste, smell, and feeling, develops a practical psychology of flavor perception. It explains fully the physiology of flavor receptors, and the means for stimulating or repressing them to attain desired flavor objectives.

Practical data for food technologists

Gives you detailed discussion of the chemistry of flavoring agents, spices, etc., and methods for developing and retaining them in food and other products, and describes how flavor is influenced by texture, temperature, freezing, dehydration, and other processes. Outlines methods for prevention of undesirable or off-flavors in commercial products, and gives tests for judging and scoring flavor quality in dairy products, meats, ice cream, bread, cake, etc.

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- detailed suggestions for proper laboratory techniques for smelling and tasting specimens for flavor quality.

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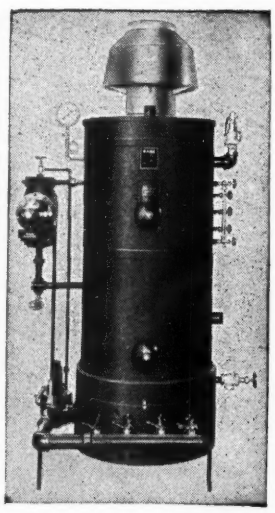

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tures, transfer fluids and insulating materials.

Insulating Materials—"Foamglas," an insulating material manufactured by Pittsburgh Corning Corp., 632 Duquesne Way, Pittsburgh 22, Pa., is described in a 24-page illustrated booklet. A summation of the physical qualities of the product is given, together with drawings showing its application to surfaces of various shapes.

MATERIALS HANDLING

Materials Handling—"Materials Handling Analysis Guide" is a new 36-page booklet published by the Towmotor Corp., Cleveland 10. The booklet discusses methods for determining better ways of handling materials. Included are methods for analyzing the problem and how to find its solution.

Conveyors — Island Equipment Corp., 101 Park Ave., New York 17, has released a two-color, 8-page bulletin describing and illustrating belt power conveyor units, including complete specifications for these units.

Lift Trucks—Answers to questions about lift trucks and their accessories are contained in a compact product data file issued by Towmotor Corp., 1226 East 152nd St., Cleveland 10, Ohio. Various models are described and their capacities given. Special uses for various accessories are explained.

Elevating Table—Lyon-Raymond Corp., 2487 Madison St., Greene, N. Y., has published Bulletin No. 141 which illustrates and describes various applications of their hydraulically operated elevating tables.

Gravity Conveyors—Speedways Conveyors, Inc., 3080 Main St., Buffalo 14, N. Y., has published a two-color 4-page booklet describing and illustrating six types of gravity conveyors and their application.

Materials Handling Trucks—Many types of trucks are described and illustrated in a 58-page catalog issued by Colson Corp., Elyria, Ohio. In it are shown and described conventional lift trucks, both light and heavy duty, platform trucks, shelf and tray trucks and shelf and box trucks. In addition, several pages are devoted to a description of various types of rubber bumpers to provide protection of walls- fixtures and equipment.

Gravity Conveyor—Information concerning the construction features and uses of eight gravity conveyor models is contained in a 16-page illustrated catalog published by Rapids-Standard Co., Inc., Grand Rapids, Mich.

FOOD TECHNOLOGY

NEW DISCOVERIES AND INVENTIONS

FERMENTATION

Mold Inhibitors

ALIPHATIC monocarboxylic acids having a double bond adjacent to the carboxyl group are described in a recent patent as highly effective fungistats in foods. Crotonic acid, sorbic acid, α-hexenoic acid, and their salts or esters, are mentioned specifically.

They are usable in fruit juices, butter and oleomargarine, cider, and in other products in which sodium benzoate is used. They avoid the objection to the benzoate that is based on the presence of the aromatic configuration. Crotonic acid and its derivatives may present a flavor problem in some cases, but the higher homologues are flavorless and odorless.

The aliphatic inhibitors further may be used in products for which sodium benzoate is unsuitable, as in bread and cakes. They may be applied to the wrapping material for margarine and similar materials.

Because of the lower molecular weight they reach an effective molal concentration at a weight percentage less than the 0.1 percent commonly necessary with sodium benzoate. In margarine and butter they have the advantage of high selective solubility in the aqueous portion, which is particularly in need of protection from molds.

Digest from U. S. Patent 2,379,294, issued June 26, 1945, on an application dated February 26, 1940, to C. M. Gooding, and assigned to The Best Foods, Inc., New York, N. Y.

STORAGE

Natural Ventilation in Grain Storage Bin

PLACING of small pipes for sampling throughout a large open-top commercial grain storage bin permitted temperature and air composition determinations at various levels and at predetermined locations. The pipes were installed before the bin was filled with soybeans. Observations were carried on over a period of 112 days.

The grain was of poor commercial quality but not unduly moist, only one lot of the beans showing moisture high enough to be considered unsafe for storage.

Considerable air movement and ventilation were indicated. Developed in the layer with 16.8 moisture that showed the only marked heating, CO_2 was carried from the 70 ft. depth to a cooler zone at the 40 ft. level, the concentrations being respectively 0.2 and 4.1 percent, with the temperatures 115 deg. F. and 53 deg. F.

Digest from "Grain Storage Studies. I. Influence of Localized Heating of Soybeans on Interseed Air Movements," by M. Milner and W. F. Geddes, *Cereal Chemistry*, vol. 22, 477-83, November, 1945.

CEREAL PRODUCTS

Anaerobic Change

"SICK" wheat, in which the seed has lost viability and the germ is darkened and rancid, has distinctly poor baking qualities, although better than heat-damaged grain.

The defect develops only when wheat is stored in large quantities and after a considerable time.

Some light is thrown on its development through laboratory observation of wheat samples held in sealed glass jars at temperatures in the range from 41 to 104 deg. F. Moisture levels range from 12.2 to 18.6 percent.

The condition can be produced in samples with as little as 12.2 percent moisture by storage at 104 deg., but it was only observed after 279 days. No damaged grains could be found at lower temperatures, with this low moisture.

Increase in the percentage of damaged kernels accompanied higher moisture, 100 percent being damaged in 108 days at 86 deg. F. with 18.6 percent moisture. With this content, 2 percent of the kernels were reported damaged in 32 days at 41 deg. F. and in 7 days at 68 deg.

There was no clear correlation of the percentage damage with the increase of fat acidity or decrease in germination. The experiments led to no definite conclusion regarding the cause, but the defect is demonstrably associated with anaerobic storage conditions.

Only a few samples showed mold growth, and these were discarded, but fungal action is not precluded as a cause. The authors suggest that suffocation may result through respiratory consumption of oxygen in the surrounding air.

Digest from "Effect of Moisture Content, Temperature and Length of Storage on the Development of 'Sick' Wheat in Sealed Containers," by E. P. Carter and G. Y. Young, *Cereal Chemistry*, 22, 418-28, Sept., 1945.

FATS AND OILS

Seed Oil Analysis

LINOLENIC acid in small but very definite amounts is reported in some samples of sunflower seed oil and in all samples of safflower oil from seed that was grown experimentally in the United States. Averages of 28 samples (4 varieties) of sunflowers from different locations and 8 varieties of safflower seeds from one location, as recently determined on the oils from hulled seed, are reported as:

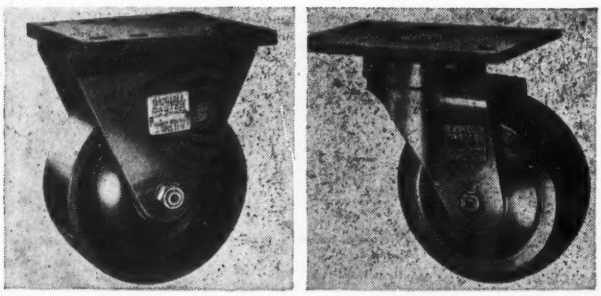
	Sunflower	Safflower
Free fatty acid, percent.	0.52	1.22
Unsaponifiable, percent.	0.8	0.5
Refractive index n 25/D.	1.47289	1.47497
Iodine No.	128.1	149.1
Thiocyanogen No.	80.2	86.1
Glycerides, percent—		
Saturated	11.0	5.7
Oleic	29.9	16.4
Linoleic	59.1	77.9

Digest from "Sunflower and Safflower Seeds and Oils," by R. T. Milner, J. E. Hubbard and M. B. Wiele, *Oil & Soap*, vol. 22, 304-7, November, 1945.

Linolenic Acid Removed

EXTENSIVE investigation into the problem of flavor reversion in linseed oil has shed light on the behavior of various other edible oils. While one group of Canadian workers recently reported why flavor reversion can not be prevented by methods other than selective hydrogenation or polymerization, another group has determined the condition under which a polymerization is most successful. The result is a product yielding 60 to 65 percent of acetone-soluble oil free of linolenic acid and hence nonreverting. The balance is an excellent high-polymer acetone-insoluble drying oil containing practically all of the linolenic fraction.

Polymerization is best at 518 to 527 deg. F. for 12 to 15 hours, with a continuous bubbling of CO_2 through the oil to remove volatile products



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which have an obnoxious odor. Acetone separation is accomplished by pouring the polymerized oil into 6 volumes of the solvent, bringing to a boil, then cooling to room temperature and allowing to stand for a sufficient period so that the supernatant liquid can be decanted. The solvent is then distilled off.

When the acetone-soluble portion of the treated oil has been hydrogenated and steam-deodorized in the usual way, baking tests show excellent flavor retention.

Digest from "The Elimination of Flavor Reversion in Linseed Shortening by Heat Polymerization and Solvent Segregation of the Oil," by O. S. Privett, R. B. Pringle and W. D. McFarlane, *Oil & Soap*, vol. 22, 287-89, November, 1945.

FREEZING

Frozen Cream

CREAM that has been frozen must be homogenized before use in ice cream or cheese, because of a tendency to oil off on thawing. The factors that produce this condition are not known, but they deserve study. If destabilization could be avoided, frozen cream would have a wider commercial interest.

The report of one series of tests on some of the factors that influence this phenomenon indicates a complex relationship with the thermal history of the milk and of the cream after separating. Two points emerge clearly. To avoid destabilization, it is necessary to start with a milk having as small a fat-globule size as possible and to handle it so that at no time does the milk or the separated cream dwell in a critical temperature zone that exists at, and immediately below, 50 deg. F.

Digest from "The Influence of Milk-Fat Globule Size and Milk and Cream Temperatures on the Stability of the Frozen Cream Emulsion," by R. W. Bell and C. F. Sanders, *Journal of Dairy Science*, vol. 28, 581-69, August, 1945.

ENGINEERING

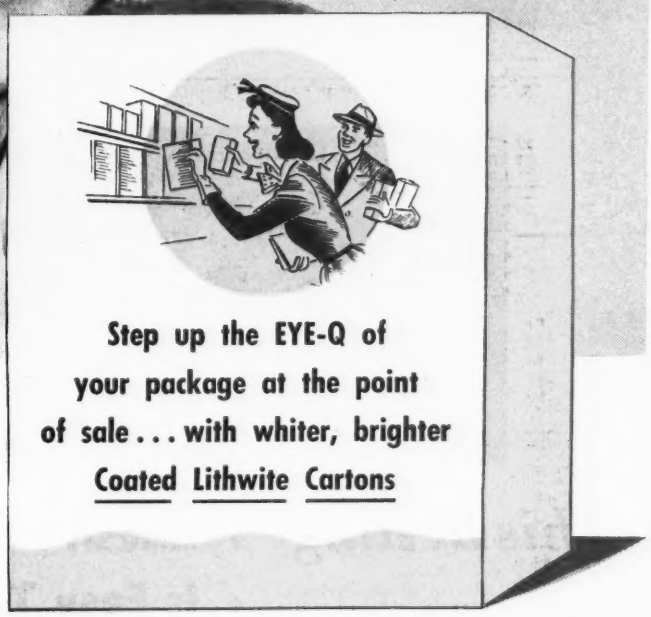
Fine Ground Spices

GRINDING of high oil containing seeds for flavoring is made difficult by the necessity to maintain the flavor and aroma constituents unaltered during the process. Thus, sticking, with resultant overheating, is particularly damaging and yet is frequently encountered. Irregular grinding, when it results in the presence of too large particles, is also very destructive to final spice quality.

A patent has now been issued that obviates these difficulties by removing the oil from the seed mass with

They have to "make eyes" at your product

. . . BEFORE YOU MAKE THE SALE



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(1) Does not deteriorate with age.
(2) May be washed with hot water or live steam.
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Globe Woven Belting is economical, well worth investigating before purchasing your next conveyor belts. Write today directly to mill supply houses or to us for further details.

GLOBE WOVEN BELTING COMPANY
1403 Clinton Ave. Buffalo 6, N. Y.

an ordinary oil expeller, grinding the seed cake in its almost oil-free condition and then returning the unaltered oil to the seed powder. Uniform fine grinding is thus possible.

It is also proposed to treat the separated oil, when this is desirable, either to remove materials that result in subsequent flavor loss through oxidation or to adjust the concentration of certain flavoring constituents, in the one case by selective solvent washing and in the other by direct addition of essential oils.

Digest from U. S. Patent 2,384,532, issued September 11, 1945, on an application dated November 12, 1941, to W. A. Bush and E. A. Lasher, and assigned to California Flaxseed Products Co., Los Angeles, Calif.

Electronic Blanching

WITH electronic heating, blanching of vegetables in the retail packages, preparatory to freezing, is reported to cause only a negligible loss of ascorbic acid. Preliminary tests with shredded cabbage showed a loss of 3 percent as compared with 32 percent cent by steam blanching and 40 per cent when water blanched. The treatments in each case were the minimum required to produce a negative catalase test.

A frequency of 150 megacycles was used, the heating time for a carton of shredded cabbage being 2 minutes with a 750-watt oscillator.

Digest from "The Electronic Blanching of Vegetables," by J. C. Moyer and E. Stotz, *Science*, vol. 102, 68-9, July 20, 1945.

DAIRY

Cheese Flavor

ANALYTICAL data on the composition of layers within and at the surface of brick cheese during curing fail to show any progressive ripening effect spreading from the surface inward. Thus ripening cannot be attributed to penetration of the cheese by enzymes generated through growth of microorganisms on the surface. Ripening occurs at the same rate throughout the cheese. The sharp protein-breakdown flavor characteristic of these cheeses does penetrate gradually from the surface inward, in a way that suggests that it is generated only at the surface.

The luxuriant growth known as the "smear" consists initially of yeast-like organisms which are succeeded during the curing period by micrococci and rod shaped organisms of the *Bacterium linens* type. This growth increases the pH of the surface layer, but the pH changes of the inner portion are about the same

(*Turn to page* 198)

Termed Far From Good

ARE WE the "best fed nation in the world"?

Dr. Charles Glen King, scientific director of the Nutrition Foundation, recently issued a warning against complacency arising out of such a belief.

He said: "In every major section of the United States and Canada, records of what individuals are eating, careful medical examinations, and detailed observations of the relation between food intake and health, all show unmistakably that we are far from having established a satisfactory pattern of food consumption."

Other authorities in the field of nutrition have estimated that between one-quarter and three-quarters *of the families in America do not get satisfactory diets.*

What to do about it? In addition to more education, many experts advocate enrichment of more foods.

So, to a large extent, the problem is up to nutritionists in the nation's food companies.

Your company may be considering, at this moment, enrichment of one or more food products.

Standard Brands Incorporated has spent much time and research in recent years developing more yeast products for Vitamin B complex and Vitamin D food fortification. These products are known for their dependability and uniformity.

If you are now seeking ways of enriching your company's products, we invite you to discuss your needs in confidence with one of our executives.

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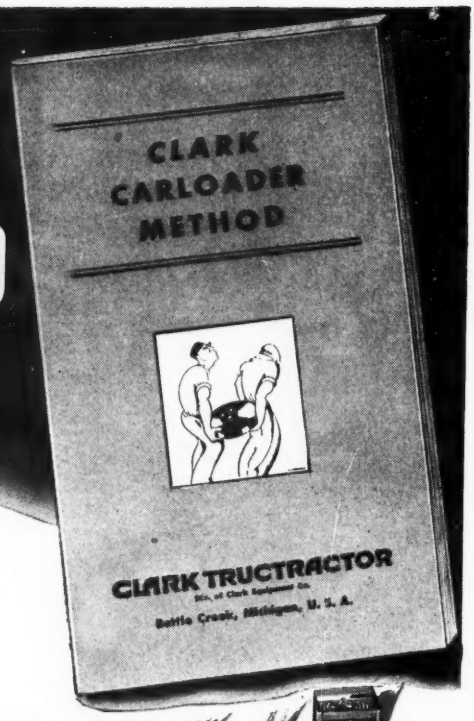

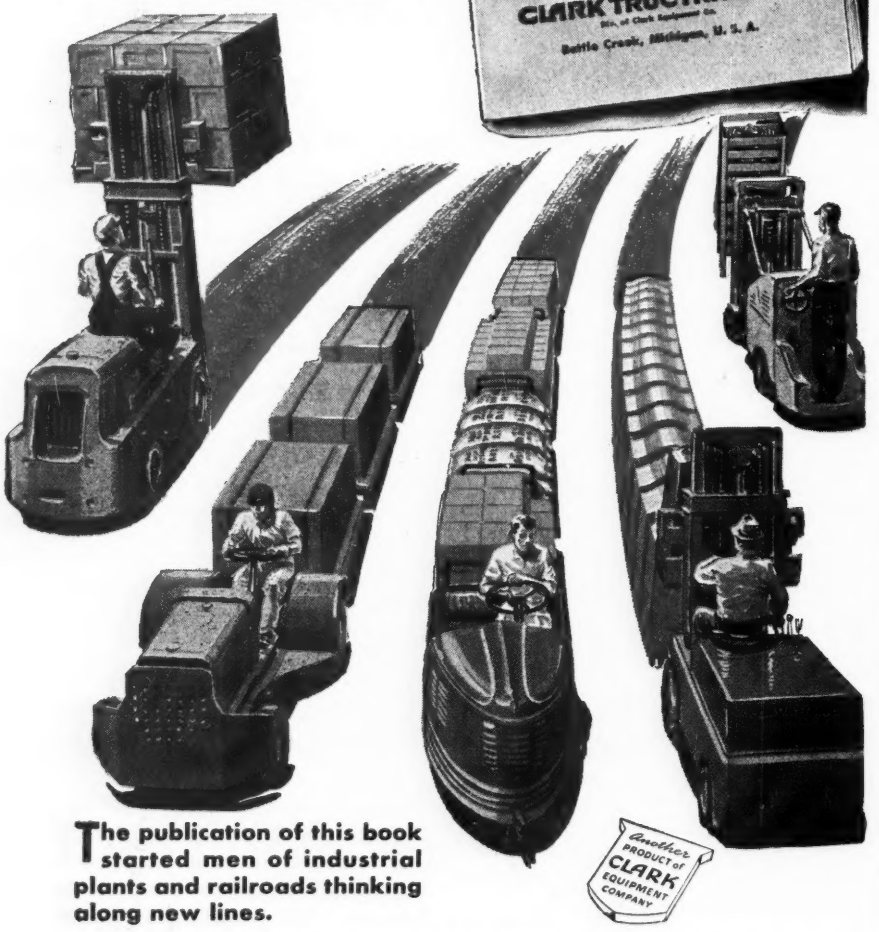

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as those of Cheddar cheese at comparable stages of ripening. There were no changes in the water- and alcohol-soluble compounds of the rind section of the brick cheeses that did not occur simultaneously in the inner portions.

Development of the smear is favored by a temperature of 58 to 60 deg. F. and by foil wrapping to exclude oxygen. It is inhibited by salting and by washing.

Digest from "The 'Smear' of Brick Cheese and Its Relation to Flavor Development," by W. L. Langhus, W. V. Price, H. H. Sommer and W. C. Frazier, *Journal of Dairy Science*, vol. 28, 827-38, November, 1945.

Milk Vitamins

RIBOFLAVIN loss for chocolate milk exposed to sunlight amounted to 12 percent in 4 hours (average of 5 brands) as compared to 80 percent for whole milk.

Recognized photofluorometric estimation methods can be adapted to the pigmented milk.

Digest from "Determination of Riboflavin in Chocolate Milk and the Comparative Photochemical Losses of Riboflavin in Chocolate and Whole Milk," by M. R. Shetlar, C. L. Shetlar and J. F. Lyman, *Journal of Dairy Science*, vol. 28, 873-78, November, 1945.

BAKING

Notes on Oat Bran

OAT BRAN contains a factor that very much reduces loaf volume when flour from green oats or from the bran is mixed with wheat, 2 percent of the groat meal in the blend reducing the loaf volume over 15 percent.

Tests made in England during the war, when it was found desirable to use oats to replace a certain proportion of wheat, showed that storage of the groats over a period of months reduced the effect, as did a dry heat treatment. Heating at 284 deg. F. for 1½ hours, or at 302 deg. for 1 hour, removed the effect. At 212 deg. F., which was about the maximum for available commercial oat kilns, treatment for 72 hours was only 50 percent effective.

Certain observations are reported as being of interest: The deteriorative factor is not fatty. It is soluble in water and can be removed from the bran by repeated washing. It is somewhat unstable in aqueous solution, the activity gradually decreasing as the solution stands. It is closely associated with the water-soluble protein, being extracted and preserved in a 3 percent salt solution. A precipitate from a dialyzate from this solution, containing 11 to 13 percent nitrogen, was active. Through precipitation with ammo-

Rate your container, Mister!

1. Put your package on the desk in front of you. Look it over. Try to estimate its eye appeal, its *interest to your customers.* Then pick up your pencil and check at right:

- Highly Attractive ☐
- Interesting ☐
- Fair ☐
- Not So Good ☐

2. Now call in some of your merchandising staff. Talk it over. Try to decide whether your container is as *efficient* as possible. Then check your answer at right:

- Highly Efficient ☐
- Good ☐
- Fair ☐
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NOW look over your check marks. If you have marked off *any* box that rates your container less than tops—*do this:*

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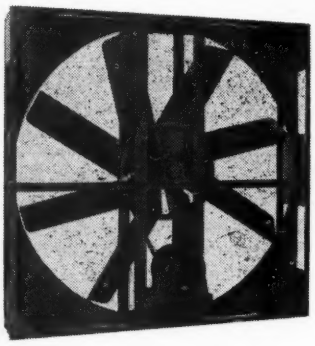

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nium sulphate, resolution and dialysis, there was only a partial loss of activity, which was probably due to some denaturation. The process could be repeated. Visually the behavior of the salt solution and its dialyzate was the same as that of a similar solution from inactive heat-treated groats or from wheat bran.

The effect is not due to amylase, fully deteriorative samples showing very little alpha amylase activity.

Digest from "On a Factor in Oat Bran Markedly Antagonistic to Baking Quality of Wheat Flour," by C. R. Jones and J. B. Hutchinson, *Cereal Chemistry*, vol. 22, 538-46, November, 1945.

BACTERIOLOGY

Mold-free Acid Buffer

BUFFERS in the range from pH 2.3 to 5.0 that are chemically and physiologically indifferent to most microorganisms can be prepared from α-hydroxyisobutyric acid (hib acid) adjusted with sodium hydroxide.

They have been shown not to vary in pH over a period of 4 years in the presence of mold spores which cause rapid changes in other buffers such as glycocoll and citrate.

Mold will grow in other nutrients in the presence of hib acid, and as it is nontoxic it may be used to adjust the pH of culture media in certain cases.

Preliminary experiments indicate that the pH range can be extended to 8.42 by the use of disodium phosphate with the α-hydroxyisobutyric acid.

Digest from "α-Hydroxyisobutyric Acid Buffers (pH 2.3-5.0) Not Altered in pH by Mold Growth," by W. C. Tobie and G. B. Ayres, *Journal of Bacteriology*, vol. 50, 333-35, September, 1945.

QUALITY CONTROL

Moisture Control Test

TO ESTABLISH the point when a batch of beef extract or similar material is evaporated to the desired extent, a moisture determination must be rapid and reasonably accurate. The method must be correlated with oven-drying tests normally used on the finished product.

Determination of density has been tried and abandoned for this purpose, but because it promised the nearest approach to a practical method it was reinvestigated.

Within the working range of this particular problem the density is a linear function of the moisture content. By using a hydrometer with as wide divisions as possible in the required range, and by individually

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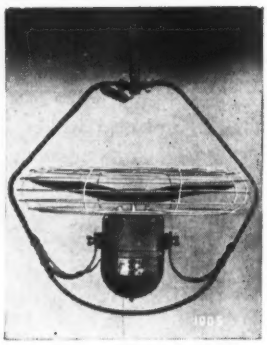

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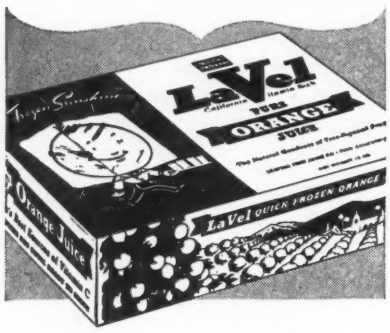

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calibrating each such instrument with density bottle determinations, significant readings can be obtained. A correction for temperature is applied, this also determined for each hydrometer. The primary object of speed would be defeated by waiting to bring each sample to a standard temperature.

The method, further, can only be applied successfully when the composition of the extract can be standardized, because soup from different parts of the animal or from different animals, as beef and lamb, will give a different viscosity for the same moisture content.

In the method adopted, 25 g. of extract is diluted to 250 g. and stirred until it is homogeneous. Temperature and density readings are then made with the specially calibrated instruments, the temperature correction applied from a previously determined curve, and the density read directly in terms of water percentage. An accuracy of $\pm\frac{1}{2}$ percent has been achieved. Hydrometer readings of density, corrected as indicated, have agreed with density bottle determinations at 68 deg. F. to within ± 0.0002. But it must be stressed that this method will not replace oven drying on the completed product. Its function is to determine quickly the point at which the extract has reached the desired moisture level and is ready to be "finished-off."

Digest from "The Moisture Content of Meat Extract. 2. A Quick Density Method for Its Determination," by A. R. Riddle, *Journal of the Council for Scientific and Industrial Research (Australia)*, vol. 18, 153-59, May, 1945.

Frozen Fruit Tests

SO_2 control tests for frozen fruit must be accurate within fairly narrow limits, but the presence in the frozen product of oxidizing enzymes and of oxygen will lead to inaccuracies with methods that are applicable to dried fruits.

A method that avoids these depends on blending in a sodium chloride solution buffered with tartrate to a pH of 4.5 to 5. The chloride stabilizes the sulphur dioxide against enzymic oxidation and also against autoxidation. Filtration yields a solution that must be treated with alkali to liberate bound SO_2 and then can be acidified with hydrochloric acid and titrated with iodine. Duplicate samples are titrated, one as acidified and one with the SO_2 bound with 40 percent formaldehyde solution. The latter gives the titer for reducing substances other than SO_2.

Most frozen fruits must be sampled and extraction started before they

CASE HISTORY No. 1

No. 1 in a series of factual experiences of a group of American manufacturers with Multiwall Paper Bags.

COST COMPARISON

	200 lb. Barrels	150 lb. Jute Bags	100 lb. Paper Bags
Container Cost	1.20	.31	.13
Container Cost Per 100 lbs.	.60	.207	.13
Labor Cost	.0250	.0250	.0125
TOTAL COST Per 100 lbs.	.6250	.2320	.1425

CLASS OF PRODUCT PACKED

CEMENT	FERTILIZER ✓
CHEMICALS	FOOD
FEEDSTUFFS	MISCELLANEOUS

PRODUCT CHARACTERISTICS

ABRASIVE	GRANULAR
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DELIQUESCENT	HYGROSCOPIC
FLUFFY ✓	LIGHT ✓
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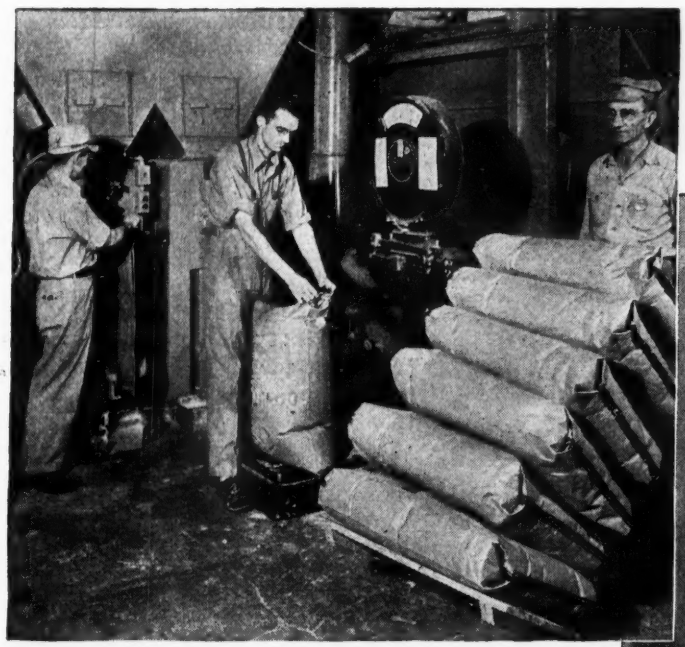
ST. REGIS BAG PACKAGING SYSTEMS are made in a variety of capacities, speeds, and manpower requirements to suit specific products and plant layouts. Machines are available in types to meet the special characteristics of a wide range of products, with filling speeds as high as twenty-four 100-lb. bags per minute — with one operator.

How MULTIWALLS *doubled* PACKAGING PRODUCTION and halved packaging costs!

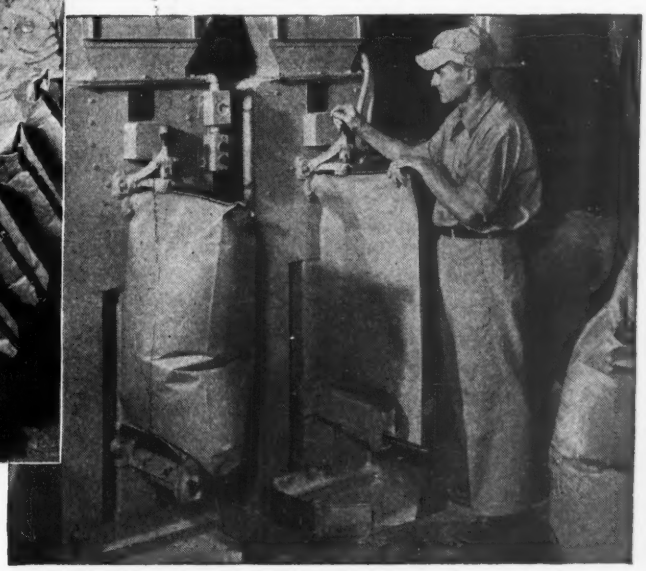
Before this company switched to Multiwall Paper Bags, they were using barrels and jute bags. Three men were needed to fill and weigh these cumbersome containers. These three men were also required for the closing operations. Labor costs were high, while production seldom exceeded 9,000 lbs. per hour.

But, after the installation of Multiwall Bag-filling Machines, it was found that one man could operate 2 filling machines while two other men checked and stacked the bags. This streamline operation results in the packaging of *18,000 lbs. per hour.*

In addition, tight, siftproof Multiwalls overcame problems resulting from siftage, dampness, and infestation. And the compact storage of empty bags provided a substantial saving in valuable floor space.



Left: These 3 men pack, check, and stack 18,000 lbs. per hour in Multiwall Valve Bags. *Below:* Showing the tandem machine arrangement of the St. Regis machines which enables one man to do the bag-filling job.



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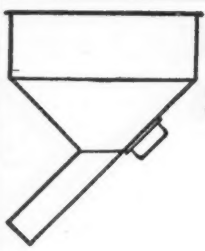
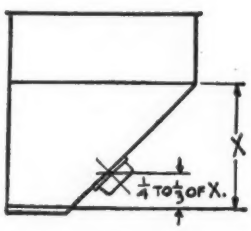
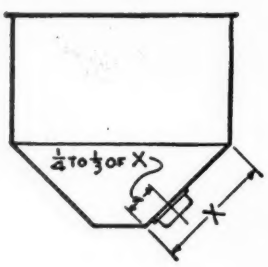


HANDLING STUBBORN MATERIALS?



Arching and hanging in, and plugging bins like these?



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thaw. The texture of many fruits, for example, that of peaches and apricots, prevents penetration of the SO_2 and O_2 much below the surface. In these, the enzymes below the surface remain potentially active before freezing and during frozen storage. The texture is sufficiently broken up by freezing and thawing so that oxidation takes place when the fruit thaws. Thus a loss of SO_2 results. With a more open textured fruit such as apples, penetration of the SO_2 is sufficiently rapid so that it generally inactivates the enzymes before freezing. Then oxidation does not occur on thawing.

Digest from "Determination of Sulfur Dioxide in Fruits," by J. D. Ponting and G. Johnson, *Industrial and Engineering Chemistry, Analytical Edition*, vol. 17, 682-6, November, 1945.

DEHYDRATION

Potato Preservation

BRITISH experience indicates that potatoes lend themselves to preservation by canning or drying more satisfactorily than to cold storage or freezing. Starches are released from the vegetable cells by freezing and a sticky pasty product results on cooking.

The Rendle process for producing dried mashed potatoes was used in England during the war period to produce about 6,000 tons of powder. This patentee found that if dried cooked mashed potato is mixed with fresh cooked mash of 80 percent moisture a friable powder of 35 to 40 percent moisture is produced. It can be dried by ordinary means. However, the best results are obtained with hot air driers designed for the process.

The powder reconstitutes with four times its weight of water at 180 to 200 deg. F. to a mashed potato of normal character, texture and taste. It can be stored in ordinary flour sacks in temperate climates, but needs containers resistant to moisture and insects for tropical conditions.

When dried by this method a ton of edible potatoes with a bulk of 48 cu. ft. reduces to 12.5 cu. ft. as packed for shipment.

The Rendle process is covered by British Patent 566,167 and U. S. Patent 2,381,838. Other methods of drying mashed potatoes are those described in a series of British patents which have been issued to Barker, 542,125; Jones and Green, 537,669, and Burton, 566,828.

Digest from "The Preservation of Potatoes for Human Consumption," by T. Rendle, *Chemistry and Industry*, No. 45, 354-9, November 17, 1945.

BOOKS

Vitamin Determination

BACTERIOLOGICAL REVIEWS. Edited by Barnett Cohen. Published by the Society of American Bacteriologists, George Washington University, 1335 H St., Washington, D. C., June, 1945. 7x10 in.; 109 pages; paper. Price, 40 cents.

Research workers and others dealing with the technic or the results of microbiological assays for vitamin determination will welcome the June issue of Bacteriological Reviews. This constitutes an exhaustive study of the literature dealing with the influence of growth factors on microorganisms. Included is an analysis of the factors requisite for a bacteriological assay method and a table showing methods proposed to date. The bibliography lists 472 titles, over 80 of these being concerned with assay methods.

As a convenient index, a large number of organisms are tabulated, with references to specific articles inserted under headings for the various growth-promoting vitamins.

Flour Milling

THE TALKING MILLSTONES. By Camilla Wing. Published by Pillsbury Institute of Flour Milling History, Metropolitan Bldg., Minneapolis 2, Minn., 1945. 7x9½ in.; 79 pages; paperboard. Free to children, grade school teachers and children's libraries.

This book is mentioned here because it offers a pleasant and interesting introduction to the history and development of the flour milling industry. Designed as a teaching aid for grade school children, it is cast in storybook form and should be useful, particularly in flour milling areas.

Carbohydrate Review

ADVANCES IN CARBOHYDRATE CHEMISTRY. Edited by W. W. Pigman and M. L. Wolfrom. Published by Academic Press, Inc., 125 E. 23rd St., New York 10, N. Y., 1945. 6x9¼ in.; 374 pages; cloth. Price, $6.00.

In general, the research contributions covered by this volume are more immediately important to the nutritionist, the physiological chemist or the research worker in high polymers than to the food technologist. But any advance in the knowledge of the behavior of starches, sugars and related substances may find itself the starting point for new developments or improvements in food processing. For that reason, the availability of this material in one place is of importance alike to the research worker and to the technologist dealing with food materials. The fact that it is, in the main, written for the non-specialist as well as for the specialist in the field greatly increases its value.

Free Trade?

INTERNATIONAL TRADE AND DOMESTIC EMPLOYMENT. By Calvin B. Hoover. Published by McGraw-Hill Book Co., 330 West 42nd St., New York 18, N. Y., 1945. 6x9 in.; 175 pages; cloth. Price, $1.75.

The Committee for Economic Development could hardly have chosen a more opportune time for the appearance of this, the fifth volume in its series of research studies. This would have been true even before the recent statement of the Secretary of Commerce advocating a general letdown in the tariff barriers to world trade.

That Secretary Wallace is not alone in his stand is attested in the author's preface. He declares that most of the industrialists of the CED, with whom he has discussed the subject, also favor the removal of protective tariffs "and other barriers to trade," as well as all state controls of international trade, whenever possible.

Despite this support, however, the author, who is dean of the graduate school of arts and sciences, Duke University, does not join in the advocacy of free trade. The policy and program he recommends is, he says, "considerably more complex than would be appropriate for a world economy in which trade was still almost wholly between individuals living and producing in capitalistic countries characterized by free enterprise and nearly perfect competition."

What Dean Hoover's policy is makes illuminating reading, whether or not you agree with his conclusions.

World Food Picture

THE WORLD'S HUNGER. By Frank A. Pearson and Floyd A. Harper. Published by Cornell University Press, Ithaca, N. Y., 1945. 6x8½ in.; 90 pages; cloth. Price, $1.50.

This is a short presentation of the world food picture. It endeavors to clear up the confused thinking which leads some to believe that there is grave danger of food surpluses, while others maintain that food scarcity is our chief worry.

The authors consider the feasibil-

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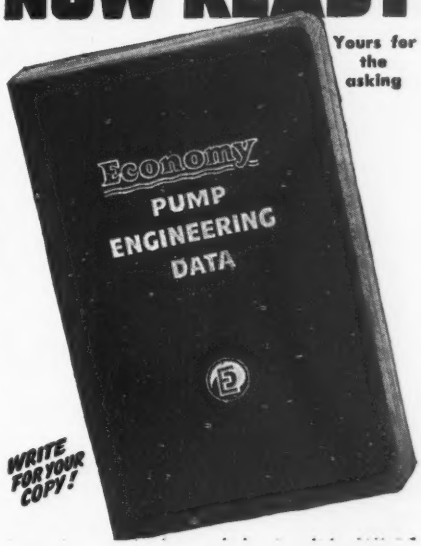

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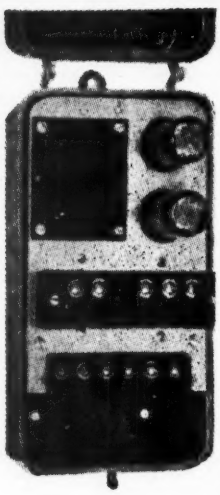

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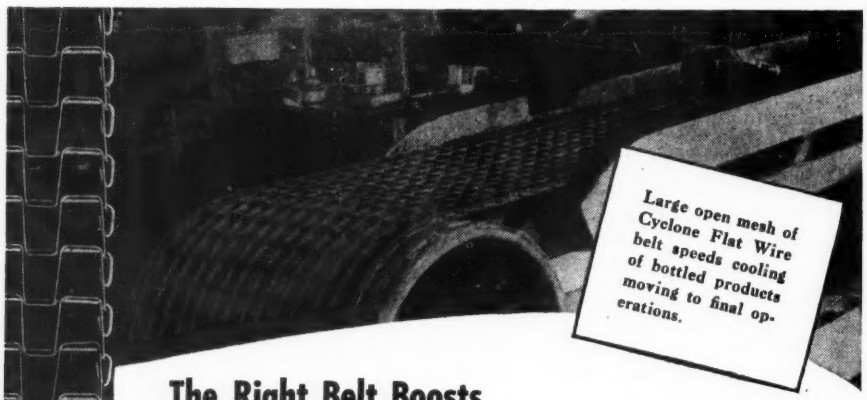

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GOVERNMENT PUBLICATIONS

ANIMAL AND VEGETABLE FATS AND OILS, CALENDAR YEARS 1940-44. Bureau of the Census. Available from Superintendent of Documents, Washington, D. C. Price, 10 cents.

PRODUCTION OF MANUFACTURED DAIRY PRODUCTS 1944. Bureau of Agricultural Economics, Mimeographed. Available (free) from Bureau of Agricultural Economics, Washington 25, D. C.

NUTRITION IN REVIEW. The report of the New York State Joint Legislative Committee on Nutrition. Available on request to Thomas C. Desmond, Chairman, 94 Broadway, Newburgh, N. Y.

DEHYDRATED FOODS. War Department Technical Bulletin, TB QM 45. Recounts the history and development of food dehydration process. Available from War Department, Washington 25, D. C.

HOW TO STOW AND TAKE CARE OF FOOD ON SHIPBOARD. Official manual of the Food Control Division, War Shipping Administration. A fully illustrated study for food exporters. Available from Superintendent of Documents, Washington 25, D. C. Price, 25 cents.

MAKING STARCH FROM WHEAT FLOUR. By R. J. Dimler. Available from Northern Regional Research Laboratory, U. S. Dept. of Agriculture, Peoria, Ill.

WARTIME FOOD PURCHASES. Bureau of Labor Statistics. Bulletin 838. Available from Superintendent of Documents, Washington 25, D. C. Price, 10 cents.

FISHERY RESOURCES OF THE UNITED STATES. Fish and Wildlife Service, Senate Document No. 51. Available from Superintendent of Documents, Washington 25, D. C. Price, 40 cents.

LABELING INSECTICIDES CONTAINING *DDT* (REVISED). September 1, 1945. Production and Marketing Administration. Available on request to Production and Marketing Administration, U. S. Department of Agriculture, Washington 25, D. C.

RETAIL DISTRIBUTION AND CONSUMER ACCEPTANCE OF DRY MILKS IN HOUSTON, TEX. By Hugh L. Cook and R. W. Hoecker. Bureau of Agricultural Economics. Available on request to Bureau of Agricultural Economics, Washington 25, D. C.

PATENTS

BAKING

Pie Pans Dispensed From Stacked Position to Filling Machine by Mechanical Means—Lloyd J. Harriss, Kenilworth, and Bernard Lambers, Oak Park, Ill., to Lloyd J. Harriss. No. 2,389,905. Nov. 27, 1945.

Semi-fluid Wheat Flour Dough Mechanically Kneaded To Separate Starch and Hydrated Gluten In Continuous Manner—Robert W. Callaghan, Keokuk, Iowa, and Gerard W. Elverum, Minneapolis, Minn., to General Mills, Inc. No. 2,388,902. Nov. 13, 1945.

CEREALS AND GRAINS

Cereal Dough Cooked, Formed Into Flattened Pellets and Explosively Puffed To Make Edible Cereal Product—Ferdinand A. Collatz, St. Paul, Minn., to General Mills, Inc. No. 2,388,904. Nov. 13, 1945.

Coffee, Nuts, Beans, Grains and Similar Granular Material Roasted in Continuous Manner in An Inclined Heating Chamber Equipped With Endless Woven Wire Band and Series of Mutually Spaced Transverse Flights—Thomas J. Stephens, New York, N. Y., to Frederick W. Ludwig, Trustee for Thomas J. Stephens, Henry A. Rudkin, and Frederick W. Ludwig. No. 2,389,650. Nov. 27, 1945.

Milled Rice Grains Fortified With Nutrients Without Development of Opacity and Without Checking, Cracking or Breaking of Grains—Ernest A. Fieger and Virginia R. Williams, Baton Rouge, La., to Louisiana State University and Agricultural and Mechanical College, Baton Rouge, La. No. 2,390,210. Dec. 4, 1945.

Solubles Extracted From Solid Material by Combination of Counterflow and Percolation—Thomas M. Rector, Morristown, N. J., to General Foods Corp., New York, N. Y. No. 2,390,388. Dec. 4, 1945.

Wheat Treated With Sodium Chlorite To Counteract Harmful Effects of Insect Damage — Cyril Harry Evans, Cleethorpes, England, to Spillers, Ltd., London, England. No. 2,389,302. Nov. 20, 1945.

DAIRY

Dried Skim Milk Powder Mixed With Fresh Skim Milk and Treated With Casein-precipitating Agent To Form Firm Curd—William F. Oatman, Geneva, Ill., to Hercules Powder Co., Wilmington, Del. No. 2,388,991. Nov. 13, 1945.

FATS AND OILS

Antioxidant Added to Fish Oils Prior to Saponification To Inhibit Destruction of Vitamins A and D During Saponification and Concentration — Loran O. Buxton, Belleville, N. J., to National Oil Products Co., Harrison, N. J. No. 2,389,955. Nov. 27, 1945.

MEAT AND POULTRY

Animal Carcasses Held at 110 to 122 Deg. F., Under Relative Humidity of About 100 Percent for ¾ to 3½ Hr. and Then Promptly Chilled To Improve Color of Meat—Beverly E. Williams and Leon L. Cadwell, to Industrial Patents Corp., Chicago, Ill. No. 2,388,891. Nov. 13, 1945.

Pork Bellies Chilled to Below 40 Deg. F., Skinned, Positioned With Skin Surfaces Together, Subjected to Pressures of 50 to 150 Lb. Per Sq. In., Cured and Held at From About 110 to 150 Deg. F. to Give Bacon With Improved Qualities—Max Britt, Winfield, Ill., to Industrial Patents Corp., Chicago, Ill. No. 2,388,823. Nov. 13, 1945.

STARCH

Starch Converted Dextrose Solution Treated With Bentonite To Coagulate Colloidal Constituents of Solution in Production of High Purity Crystalline Dextrose—Sidney M. Cantor, Riverside, Ill., to Corn Products Refining Co., New York, N. Y. No. 2,389,119. Nov. 20, 1945.

MISCELLANEOUS

Glycerol Recovered From Still Residues of Carbohydrate Fermentation—Robert Alan Walmesley, Howwood, Scotland, to Imperial Chemical Industries, Ltd. No. 2,389,173. Nov. 20, 1945.

Protein Fractionated From Blood Plasma—Edwin J. Cohn, Cambridge, Mass., to Research Corp., New York, N. Y. No. 2,390,074. Dec. 4, 1945.

Sugar Medium Containing Calcium Sulfite Fermented With Yeast To Produce Glycerol—Ellis I. Fulmer, Leland A. Underkofler, and Richard J. Hickey, Ames, Iowa, to Iowa State College Research Foundation. No. 2,388,840. Nov. 13, 1945.

CANADIAN PATENTS

Tasteless, Odorless Chewing Gum Base Made From Polyvinyl Ester, Plasticiser Relatively Insoluble in Water, Mineral Filler and Oleaginous Stabilizer To Prevent Separation Between Filler and Ester—George J. Manson, Brantford, Ontario, to Shawinigan Chemicals, Ltd., Montreal, Quebec. No. 431,103. Nov. 6, 1945.

Grain Enriched by Alternate Steeping in Water Extract of Grain and Grain Offals to Moisture Content of Approximately 38 Percent and Drying to Approximately 18 Percent Moisture Content — Francis Heron Rogers, Kenley, County of Surrey, England, and Erich Gustav Huzenlaub, Brentford, County of Middlesex, England. No. 431,113. No. 6, 1945.

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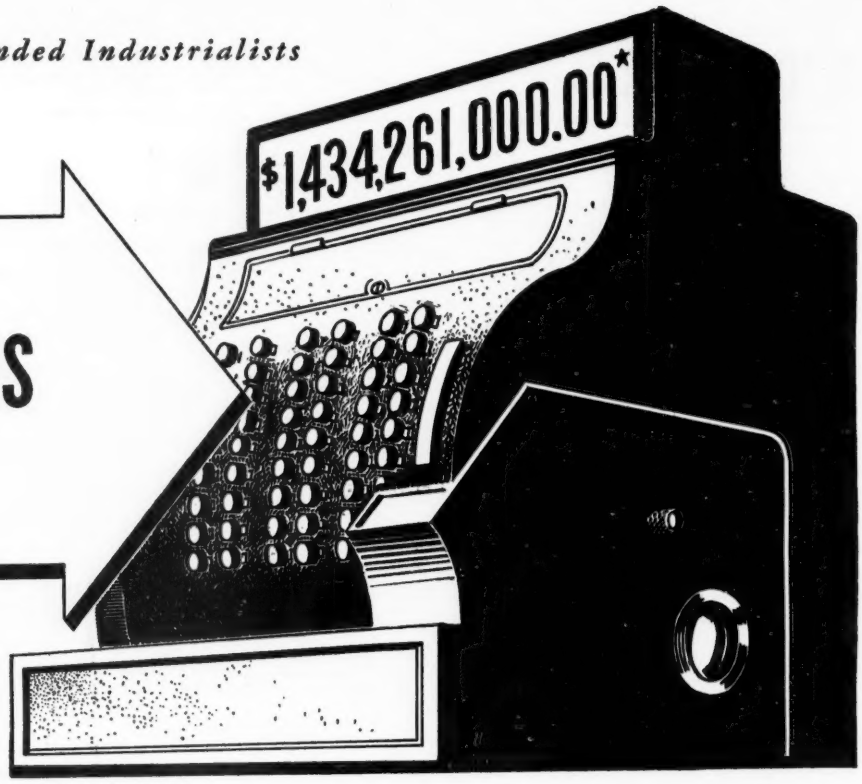
LOOK AT THE LOS ANGELES MARKET



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More on "Poor Richard"

Offers Poor Richard a Job

To the Editor,
FOOD INDUSTRIES:

WE have read with a great deal of interest the special feature article in the October number of FOOD INDUSTRIES entitled "Salaries for Food Technologists." Frankly, we think Poor Richard has plenty on the ball and that he is a lot nearer being right than his critics. We know he is 100 percent right in his concluding paragraph. If he has any interest in a research program and is actually looking for a place where he can let his talents develop and get paid for it, we would like to hear from him.

The whole question of salaries for food technologists and food research men came up in the Association meeting just the past week, and actually the writer was just as disgusted and discouraged as Poor Richard at some of the ideas expressed by corporation executives.

There is s o m e t h i n g radically wrong either with the education or the thinking of these individuals in their failure to properly evaluate the part that food research can play in the scheme of things, particularly from this time forward. If the war did nothing else, it certainly should have opened the eyes of industry to the part that research can play in that outline of the things to come in the future. If the atomic bomb hasn't jarred us loose from our prewar thinking, then there is no hope for us.—*President, Company D.*

Fault Lies with Colleges

To the Editor,
FOOD INDUSTRIES:

MY first reaction to the whole Poor Richard matter is "So What?" When an individual exercises the proper vision and initiative he doesn't stay long in a minor position. If he has neither, there isn't a derrick big enough to lift him out of his rut. What difference does it make whether or not Don Nelson ditched technology—he made a pretty good showing in the administrative side of business and his basic training served him in good stead. After all, let's be reasonable—technology must not be the wheel to which Prometheus Technologist is bound for life.

He attempts to justify a greater recognition of the profession—not necessarily the individuals that comprise it. While it is true that any advance in civilization has resulted from painstaking research, technologic or otherwise, still someone must have had the vision and willingness to furnish venture capital to make it possible. In the vast majority of cases neither has been furnished by the technologist.

I present no brief for the would-be employer who magnanimously offers the suppliant technologist a salary but one step removed from that of his night watchman. Nor do I condemn him altogether for his low opinion of the profession. He doesn't know any better. Scientists, particularly chemists, are often a narrow and unsociable lot. Somehow they never realize that they, too, are human beings and as such are an integral part of the organization from which they draw s u b s i s t e n c e, meager though it may be. All too often they forget or refuse to come down from their ivory tower and associate with the common herd.

No, I am afraid the major fault is neither that of the employer nor that of the technologist. It goes back to college training, where too little time is spent in developing individual initiative and personality and too much effort expended in trying to fit an unknown product into an historic mold. The result is obvious—too often it is *canned ham.* What most technologists lack is an awakened ego—a good basic training in human behaviorism, public relations, and especially in advertising and selling one's wares.

What most present and prospective employers lack is an awakened sense of dependence upon research and technology for continued advance in their respective businesses.—*Executive, Company C.*

Another Aspect

To the Editor,
FOOD INDUSTRIES:

I HAVE read Poor Richard's article in the October issue of FOOD INDUSTRIES with a great deal of interest. I am glad the article was printed for I have seen many cases of the kind he describes, and I think the subject needs public discussion. I wish to present one aspect of this subject which Poor Richard did not mention.

I am faculty advisor in one of our larger universities for those students who are preparing themselves for technical jobs in the food industries. These students are required to seek

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employment in some branch of the food industries during the summer vacations so that they may gain practical experience along with their academic training.

It is my contention that these men should receive special recognition from their employers. I do not mean that they need high wages. I admit that they are essentially unskilled labor—as green as grass, if you wish. On the other hand, I contend that the potential value of these men to the food industry is such that they should be tried out in various positions.

They should be aided and encouraged to learn as much as they can, and the management should be studying them to see which ones will be valuable as permanent employees after graduation.

In many cases, perhaps a majority of cases, this does not happen. Because the student is a temporary employee and because he has little practical knowledge of operations, he is often assigned some routine job where he is forgotten.

Most of these men are above average in intelligence and ambition. In most cases they apply to a particular company, not primarily to get on the payroll but to learn. Too often they are left for three months on a can washer or bottle filler, with little opportunity to see anything else. As a result, many of the best students abandon the idea of entering the food industries. Can you blame them? If, after two or three years of college, they are treated as common labor, can they expect any more consideration after four years of college?

This is another manifestation of Poor Richard's criticism that many employers seem unable to recognize the value that specialized training may have in their business. It is not appreciated when they hire men; it is not utilized after they are hired. And because its value is not recognized, the industry loses the services of many who might be leaders in years to come.—*A Professor.*

Terrific

To the Editor,
FOOD INDUSTRIES:

I AM a potential "food technologist!" I have been in the Army Air Forces for the past three years. I would just like to voice myself a little on Poor Richard's article.

It was, without a doubt in my mind, terrific—it was out of this world—it was truer than true can be—it was great—he sure has the guts I admire in a man—prof or nonprof! —*A Subscriber.*

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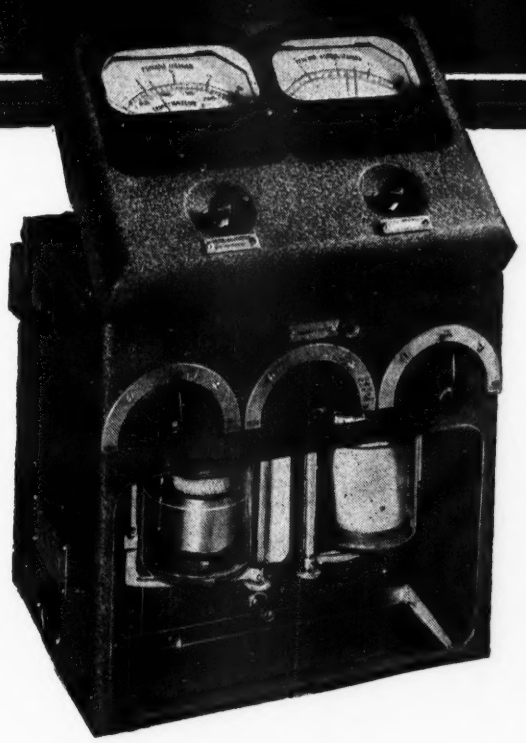

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Rotary Lye Peeler

(*Continued from page* 79)

The wheel is driven by a ¼-hp. motor through a speed variation unit and reducing gear. Ordinary varieties of sweet potatoes require an average drum speed of 1 revolution in 9 minutes under conditions in the Laurel plant. When Irish potatoes were processed this speed was doubled. The drive assembly is mounted on the top of the peeler over the main shaft extension, where protection from occasional steam and fumes is afforded. The assembly consists of the motor, one of the standard speed-variation assembles utilizing rubber V-belts and adjustable-disk pulleys, and a worm-gear speed reducer of small capacity, and with a reduction ratio of about 750 to 1. The output shaft of the gear reducer is connected to the main shaft of the drum by roller chains and sprockets which effects a further 10 to 1 reduction. The self-locking nature of the reducer prevents the paddlewheel from driving the motor, which it tends to do in normal operation. The drive is in reality largely a timing mechanism, since the weight of the potatoes on the input side of the wheel drives it in much the same way as an overshot water wheel.

Heating and Temperature

Various other factors to be considered in the construction of rotary peelers for a specific installation are the method of heating, temperature control and preparation of the lye solution.

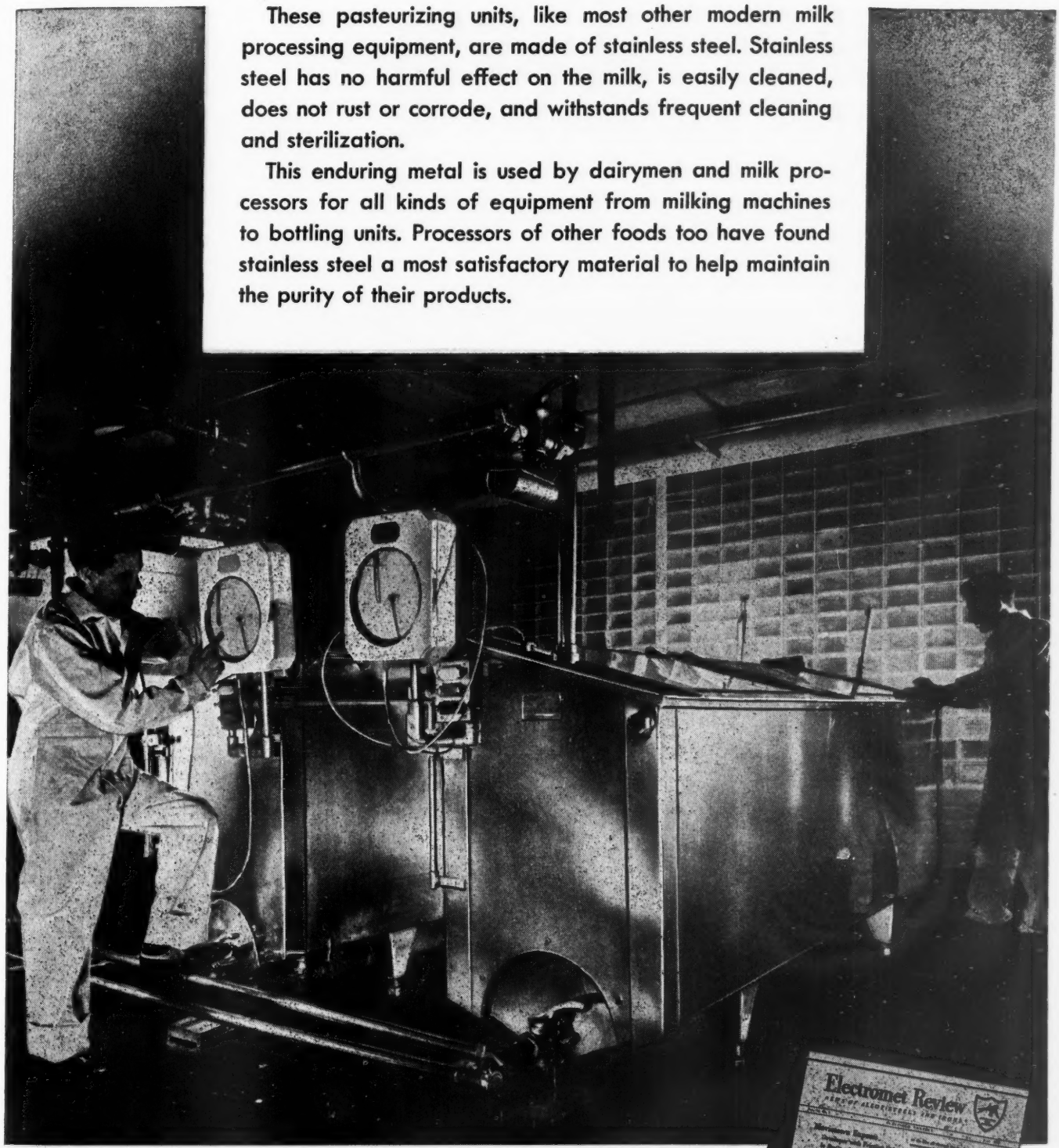
One satisfactory arrangement of heating units, if a source of steam of at least 30 p.s.i. gage pressure is available, is to have two coils, each consisting of 36-in. lengths of 1-in. pipe fitted with return bends. The smaller coil in the discharge end of the tank consists of 9 lengths, while the larger coil contains 17 lengths. Both can be supported on a cradle of light angle iron which, in turn, rests on other angles welded to the tank sides. At the proper location, nipples can be welded into the tank bottom for inlet steam and discharge condensate. The coils, if fastened to the nipples by union, are then easily removable. All efforts made to insure leakproof heating coils will be very well repaid in decreased lye costs. Extra strong pipe and heavy-duty forged fittings are worth while. It is preferable to trap coils individually.

It is essential to have some method of determining and controlling the temperature of the lye. An indus-

Processing Milk in STAINLESS STEEL

These pasteurizing units, like most other modern milk processing equipment, are made of stainless steel. Stainless steel has no harmful effect on the milk, is easily cleaned, does not rust or corrode, and withstands frequent cleaning and sterilization.

This enduring metal is used by dairymen and milk processors for all kinds of equipment from milking machines to bottling units. Processors of other foods too have found stainless steel a most satisfactory material to help maintain the purity of their products.



Other uses of stainless steel are described in ELECTROMET REVIEW, published by ELECTRO METALLURGICAL COMPANY, a Unit of UNION CARBIDE AND CARBON CORPORATION. ELECTROMET does not make steel, but produces the ferro-alloys used in its manufacture. If you need this complimentary publication, write to ELECTRO METALLURGICAL COMPANY, 30 East 42nd Street, New York 17, N. Y.

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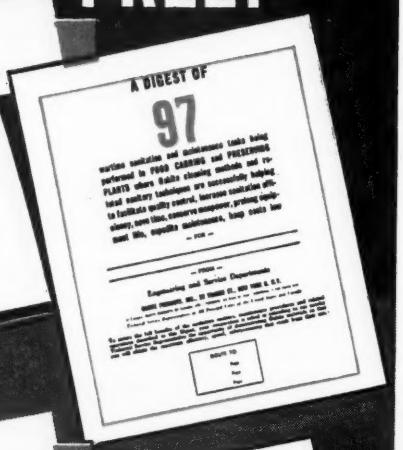

2. MEAT PACKERS DIGEST

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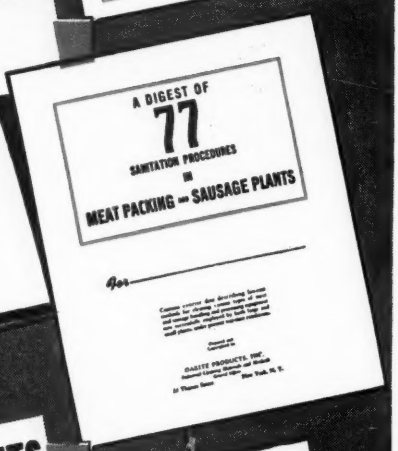
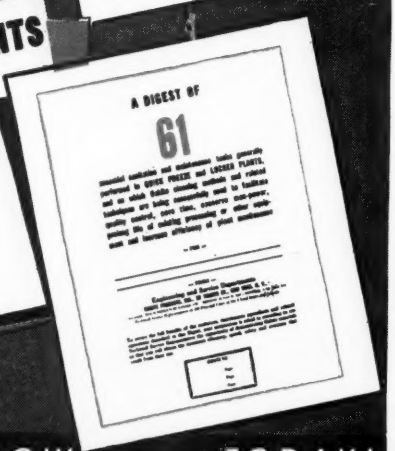


3. QUICK FREEZE & LOCKER PLANTS

This Oakite Sanitation Digest, expressly prepared for operators of quick freeze, dehydrating and locker plants, gives many valuable, time-saving tips on daily clean-up of processing and handling equipment. A special section is devoted to safeguarding product quality through germicidal treatment of equipment surfaces.



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trial-type angle thermometer, inside a well in the hot bath, may be used for indicating purposes. A self-activating temperature controller, together with an automatic regulating valve on the small steam coil, are recommended.

Preparation of Lye

The caustic soda or lye is made up in a separate steel tank provided with a cradle near the top to support drums of solid caustic soda.[2] The water level is adjusted in the tank until the drums, which have been perforated with a pick, are approximately half covered. The lye solution diffuses through the holes, and all of the solid is dissolved in approximately 12 hours. The lye level is maintained in the peeler, as stated before, by pumping from this storage tank.

Acknowledgment

The technical assistance of F. A. Crenshaw and T. A. McLemore in the experimental work leading to development of the peeler is gratefully acknowledged. Similar acknowledgment is due Irvin E. Jones of Sweet Potato Growers, Inc., for fabrication of the experimental model.

References

[1] Mazzola, New Caustic Peeling Method Reduces Waste, *Food Industries*, January, 1943, p. 53.
[2] Dunlap, Lye Peeling Pays Off, *Food Industries*, December, 1944, p. 73.

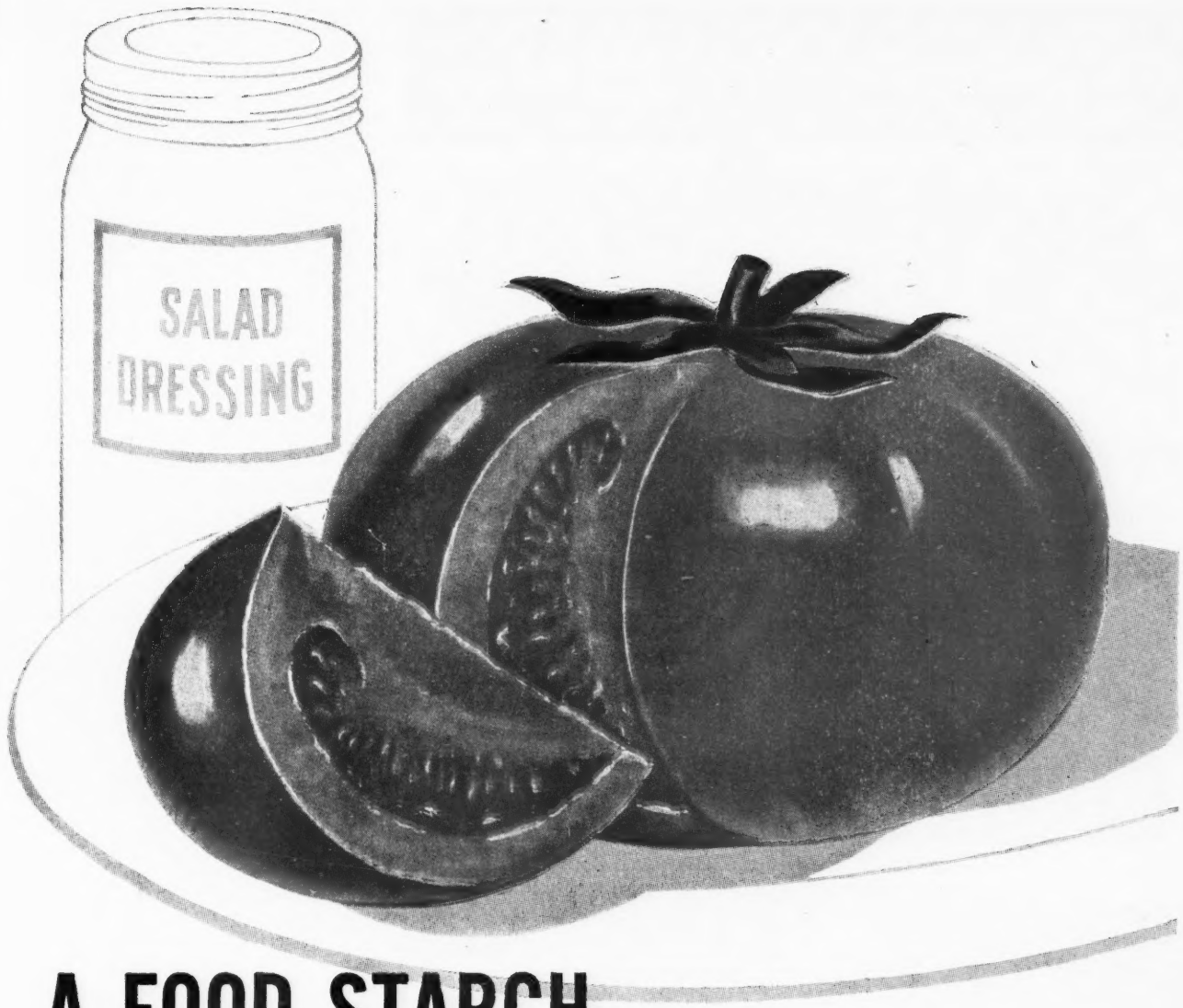
—End—

Oil of Angelica

(*Continued from page* 106)

before planting. The plant is most readily propagated from divisions of old roots, which may be set about 18 in. apart in rows, either in the fall or spring. The seed germinates very poorly if more than one year old; therefore, it should be sown as soon as ripe in seed beds kept moist by watering at regular intervals. Early in the following spring, the seedlings are transplanted to their permanent location and set about 2 ft. apart in each direction. Plants may also be raised from seed sown during March in a spent hotbed or coldframe. To increase root development, the plants are sometimes transplanted a second time, after the first year's growth, and set 3 or 4 ft. apart. For the same reason, the tops are often cut back to prevent formation of seed. Frequent cultivation during the growing seasons keeps the soil mellow and free from weeds.

The roots usually are dug up in fall of the second year, but occasionally roots of "first year plants" are marketed. The harvested roots are



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Note: National has compiled a useful handbook of facts on "SALAD DRESSING PRODUCTION". It outlines principles and procedures found by experience to constitute proper commercial practice. It should interest everyone producing or contemplating the manufacture of salad dressings. Write for your copy.

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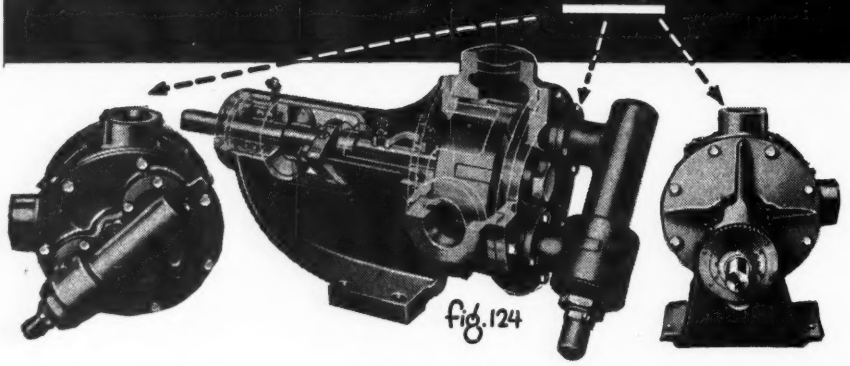

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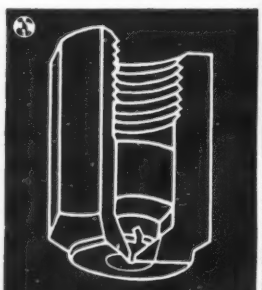

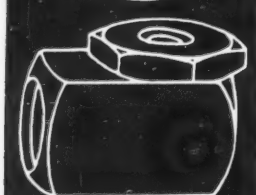

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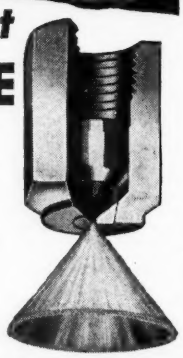

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washed and dried in the open air. To keep out insects and preserve the aroma, it is advisable to store the dried roots in tightly closed tin containers. It has also been suggested that the roots be preserved by the addition of a few drops of chloroform or carbon tetrachloride.

According to Willkie and Kolachov,[21] one acre of angelica requires 8 to 11 lb. of seed and yields 900 to 1,300 lb. of dried root.

Canadian Angelica Root Oil

Bedoukian[22] reported about an angelica root oil distilled during 1943 from fresh root material grown around Montreal. The seed had been obtained from the Montreal Botanical Garden and had been verified as true *Angelica archangelica officinalis*.

The Canadian oil had the usual physico-chemical properties of oils from other countries, except for the optical rotation, which was levorotatory. Bedoukian attributes this factor to climatic conditions, but does not exclude the possibility that the plant may have developed a new strain because of unknown conditions.

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[3] *Parfums France, 12*, (1934), 15.
[4] *Ber. 15* (1882), 1741.
[5] *Bull. soc. chim.* II., *39* (1883), 407.—*Compt. rend., 96* (1883), 1153.
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[9] *J. prakt. Chem.*, II, *83* (1911), 243.
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[21] Domestic Production of Essential Oils from Aromatic Plants, Bull. of the National Farm Chemurgic Council, 1940.
[22] *Am. Perfumer, 46*, Aug., 1944, 54.

—End—

Mass Feeding

(*Continued from page* 110)

time it reaches the ultimate consumer in this market. The dining patron does not care what brand of baking powder, cheese, coffee, or what have you, went into the preparation of his meal. He only cares whether or not it is good. And if it is good food, he credits the establishment rather than the original source of supply. Therefore, this market must be reached through the comparatively few who purchase and cook for many.

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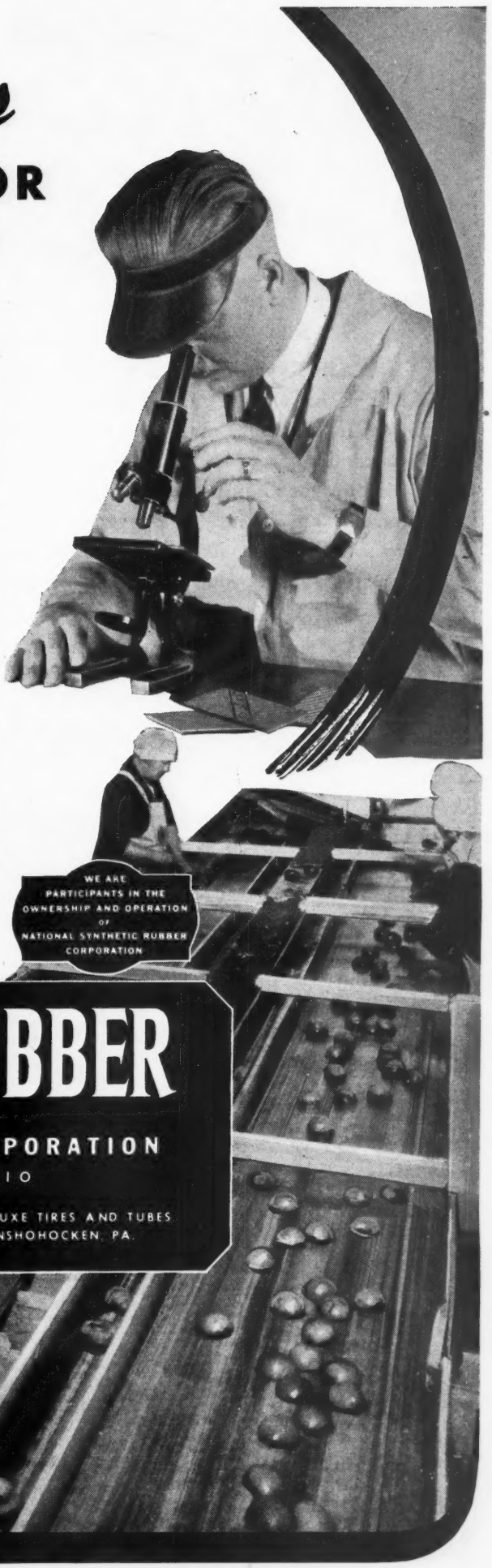

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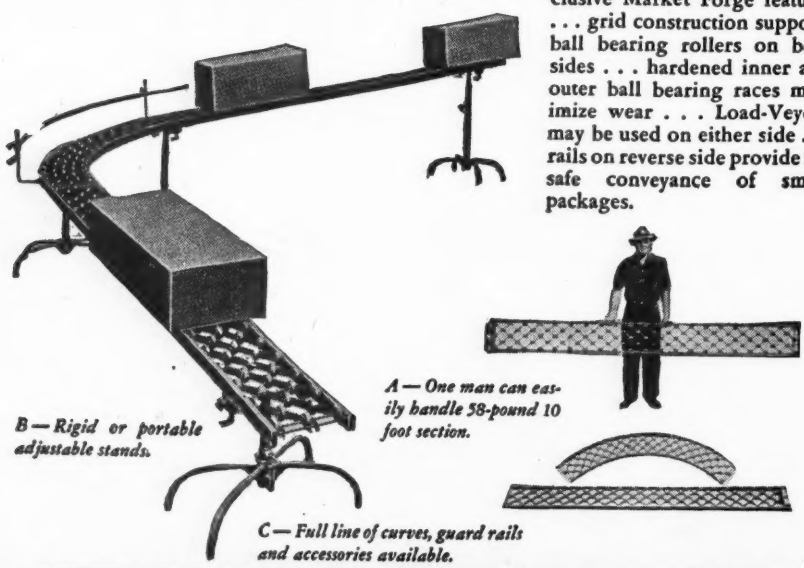

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Comparison of Fresh Canned and Frozen Peaches

(Analysis made in August. Market fluctuations will effect buying decisions.)

Frozen Peaches

35 lb. pack at 28c per lb. = $9.80.
Fruit defrosted and drained weight = 316 oz.
Liquid and sugar = 244 oz.
Fruit = 50% of total weight.
Cost of fruit per oz. = $0.0310*

*Liquid, which includes sugar and natural fruit juice, also has value which would slightly reduce net cost of the fruit.

Comment: Fine quality fruit—full-flavored liquid.

No. 10 Can of Peaches*

Yellow Freestone Alberta peach halves, packed in water, labeled "Below standard in quality—good food—Not high grade."
Cost of No. 10 can = $0.6825.
Net weight per label = 103 oz.
Drained weight = 77 oz.
Fruit = 74% of label weight.
Cost of fruit per oz. = $0.0089.
Liquid slightly peach flavored.
Comment: Bright color, pleasing home-preserved aroma, broken soft halves, bruised spots, good flavor for water pack fruit.

*Eliminated because the fruit did not meet our standard for pies and tarts.

Fresh Peaches (Elberta, Pennsylvania; 2-in. minimum)

Net weight = 49 lb.
Cost per bushel = $5.00.
Yield weight (blanched, pitted, sliced peaches) = 34½ lb.
Prepared fruit = 70% of original weight.
Purchase cost of fruit.....$5.00
Labor cost (4⅛ hours at 76c hourly rate) 3.29

Total actual cost of sliced peaches....$8.29
Cost per oz. (yield weight) = $0.0150.
Comment: Quality excellent, color natural, full flavor, medium sweet.

Analysis

Cost of frozen peaches per oz. = $0.0310
Cost of fresh peaches per oz. = 0.0150

Saving per oz. on fresh = 0.0160*

*Saving on 34½ lb. (552 oz.) = $8.83—However, allowance must be made for value of 15 4/16 lb. sugar and sirup drained off frozen peaches. Approximate value at 10c per lb. = $1.50.

Therefore, the net gain on the 34 1/6 lb. of fresh sliced peaches = $7.53.

—End—

Meat Dehydration

(*Continued from page* 101)

be involved in commercial production. After consultation with Dr. Vickery, Council for Scientific and Industrial Research, of Australia, an analysis of the problems involved was made. At this stage, the United Kingdom Ministry of Food placed an order with New Zealand for commercial quantities and asked that facilities be made available in the country for the annual production of some 5,000 tons of the product. The responsibility for the whole undertaking was then assumed by the New Zealand Department of Agriculture.

Owing to the impossibility of procuring certain structural materials

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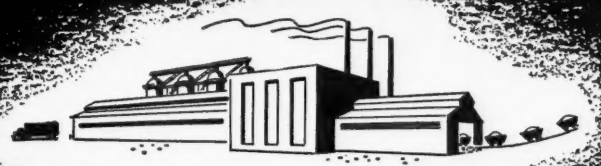

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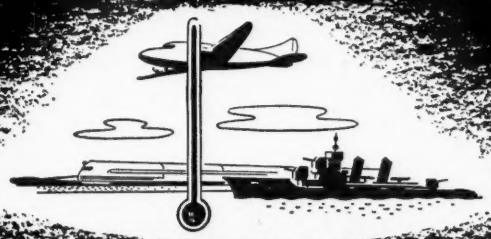

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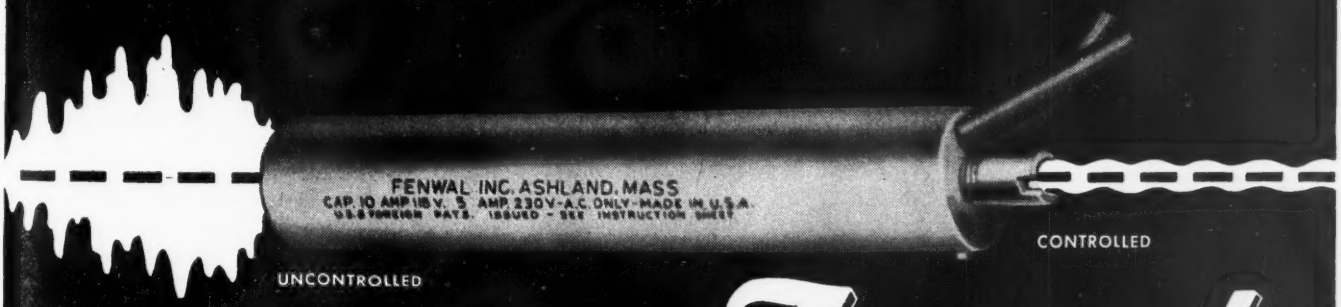
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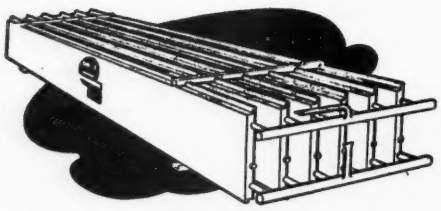

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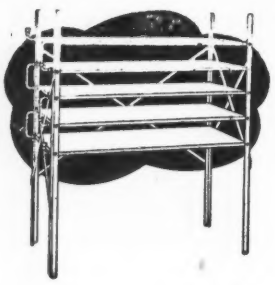

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within the required period of time, the final form of the plant was influenced accordingly. One of the first decisions which had to be made was whether to erect a single factory with the required output at some central point, or to erect a number of small plants adjacent to slaughter houses. As stated previously, the decision was finally made to erect one large factory at a central point. This decision was reached for the following reasons:

1. In view of the shortage of materials and labor, the erection of one unit seemed to be the most practicable solution.
2. By having the production concentrated in the one factory, there was more likelihood of achieving a uniform standard of quality.
3. The technical staffing of one unit did not place as severe a strain on technical personnel as would have been the case with a number of small units.
4. On account of the large number of slaughter houses in the Dominion, it would have been impracticable to have erected dehydration plants adjacent to each slaughter house.

The factory was a well-lighted ferro-concrete structure with clean, simple lines.

—End—

Employee Relations

(*Continued from page* 76)

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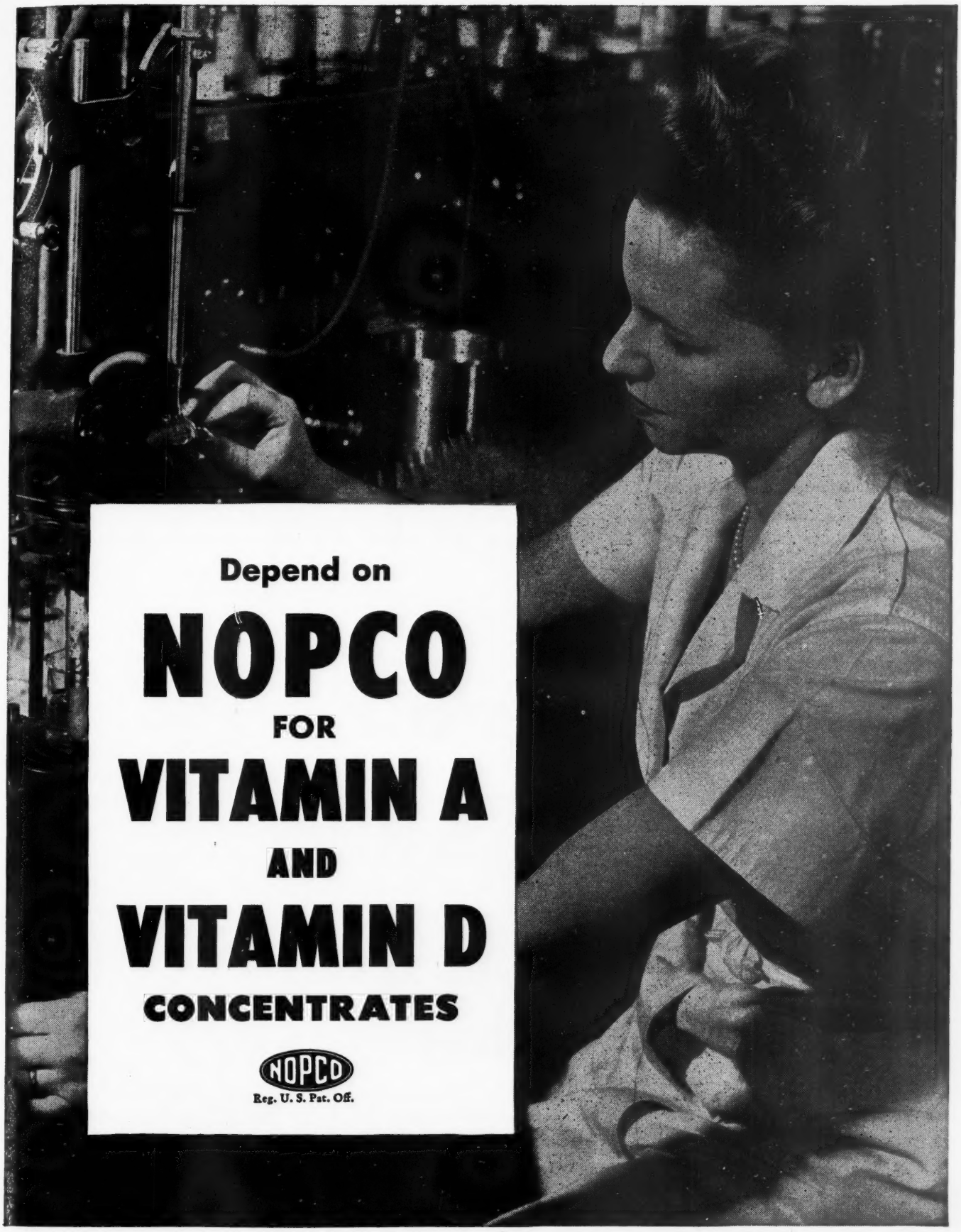
Hiring and Firing—Decentralization of personnel department to give foremen the final say on accepting new recruits, or recommending transfers or discharges. No worker should be retained in any department over the foreman's protest.

Settling Grievances—This is a two-pointed topic. Foremen don't like to be bypassed by subordinates and union stewards who take their complaints higher up. Upper management should not concern itself with such grievances, except upon appeal from the proper foreman's ruling. Foremen's own grievances also should be settled promptly.

Take - Home Differential—Foreman's take-home pay should exceed that of highest-paid worker under his direction by 15 to 30 percent. In



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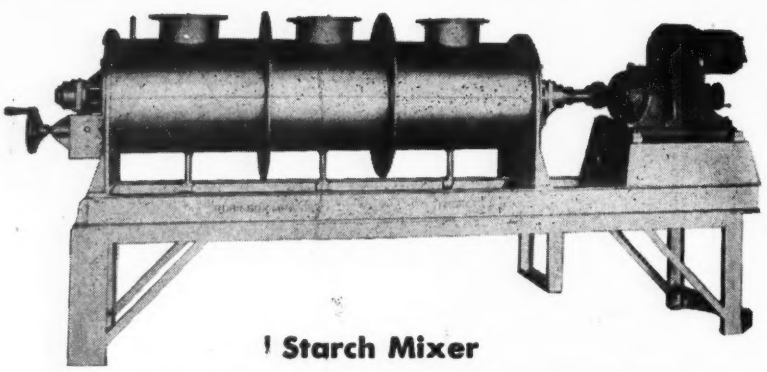

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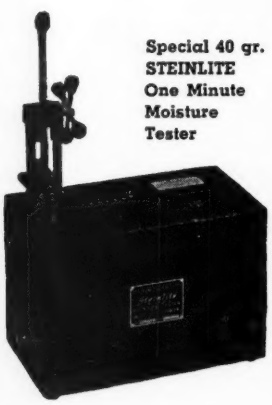

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addition, foremen should receive such benefits as time-and-a-half for all hours over 40; paid sick leaves; longer vacations, with pay, than those accorded the rank and file. Foremen also like special bonuses geared to accident reduction, decreased spoilage, lower labor costs, and so forth.

Seniority and Job Security—The best device is to allow foremen accumulated seniority from the time they joined the company, to protect them if cutbacks necessitate demotion to production jobs. Demoted foremen should not be reduced in pay for at least 90 days, and the ultimate rate should not be less than the maximum for the new classification. Such ex-foremen should retain seniority rights for reinstatement in supervisory jobs when opportunity permits. Foremen should also be included in the company's retirement plan.

Promotion and Advancement—Keep the foreman's job from being a dead-end street. If supervisors see possibilities for self-improvement, they will be more interested in training subordinates for upgrading. The foreman conference is an excellent medium for developing latent executive ability.

White-collar Workers

Every fringe increase awarded by the WLB whittled something away from the traditional preferred status of office personnel. Now that production workers enjoy vacations with pay, sick leave, hospitalization, separation pay and other benefits, once applied only to technical and clerical employees, white-collar people tend to feel that they are losing ground. In addition to witnessing the benefits that factory personnel have obtained from unionization, many typists, stenographers, bookkeepers and clerks have had actual shop experience during the war—including that of belonging to a union. They are losing their fear of unionism and are no longer ashamed to go out on the picket line. As a result of these trends, the white-collar contingent is feeling its muscles, and its sense of power is growing.

There is no easy solution to this problem. It is difficult, both in logic and in practice, to justify special privileges to office employees and withhold them from workers in the plant.

For all these difficulties, and for the hundred and one accompanying situations, which add up to make the current labor crisis, there is only one sound, honest, forthright system of labor relations. The technics and procedures that weld management and

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the working force into a harmonious team have stood the test of wartime. Now it devolves on us all to apply these methods to our peacetime problems.

—End—

Lecithin in Bread

(*Continued from page* 87)

suited for this, with the edge perhaps going to the dry form for complete ease of handling. The flour carrier has the advantage of calling for increased absorption for the flour. While this increase is only 0.6 lb. for each pound of flour, the dry surface characteristics imparted by the lecithin would, however, justify an increase in water on a pound for pound basis.

Where to incorporate lecithin is again a matter of preference. It makes little difference whether the addition be made either in sponge or dough, on top of the flour or with the small ingredients. Experience shows, however, that incorporation with the small ingredients at the time of breaking up the sponge will give a more complete dispersal. This should be recommended for lecithin as well.

The influence of lecithin on absorption is an intangible one. As demonstrated by the recording-mixer curves, lecithin does not change dough consistency. But it does modify dough conditions and could call for an increase of water absorption. How much of an increase is feasible depends entirely upon the production man. Lecithin works as well in the stiffer doughs as it does in slack ones, so here again the results preclude any definite recommendation.

At proper levels of lecithin there is no adverse influence upon fermentation. Nor was a distinct beneficial effect observed, although the handling properties of the older doughs were better with lecithin than without.

Presence of lecithin was most notable in improved handling properties of the doughs at makeup. The doughs were more elastic and lively and had a distinctly dried feel. Dusting flour requirements were less than those of the control doughs. The skin formed in the molding operation showed less signs of tenderness. This would indicate easier handling through make-up machinery.

Proof and baking time were not influenced by the lecithin, and in most bakes there was no apparent difference in the crust color of lecithin-containing and control loaves.

In the finished product, the presence of lecithin had little or no effect on volume. The notable improvements were a more tender crust, finer grain and texture, more symmetrical appearance, and longer lasting freshness. There was no effect on crumb color other than the illusion of whiteness brought about by finer cell structure.

Weights of loaves out of the oven were taken, but no effects on this factor by the lecithin were noticed. But the keeping-quality test, though crude in method, did indicate that the lecithin retarded the starch-protein water transfer commonly associated with staling. In this connection, a loaf containing lecithin (0.3 percent) with 1 percent shortening had keeping qualities equivalent to those of a loaf containing no lecithin and 4 percent shortening. But the loaf with 3 percent shortening and 0.25 percent lecithin exhibited superior keeping qualities.

The tests performed were perhaps more practical than scientific, but we think that the value of lecithin in bread was satisfactorily demonstrated and that present claims for lecithin inclusion in bread formulas are justifiable.

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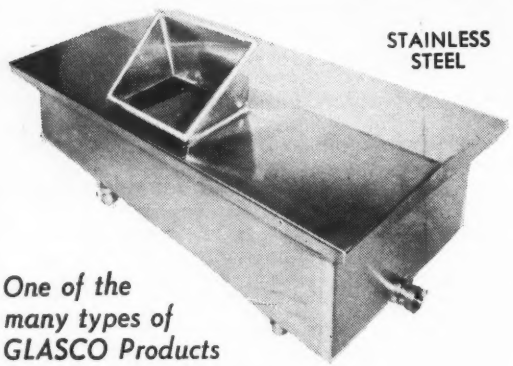

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